Prepared for

BFI Waste Systems of North America, LLC
Hanover Park, Illinois 60133

QUALITY ASSURANCE PROJECT PLAN

MIG/DEWANE LANDFILL SUPERFUND SITE
BOONE COUNTY, BELVIDERE, ILLINOIS

0070050002- BOONE COUNTY
ILD 980497788

Prepared by

Geosyntec consultants

engineers | scientists | innovators
134 N. La Salle Street, Suite 300
Chicago, Illinois 60602

Project Number CHE8214

Revision No.1: 6 November 2006
Revision No.2: 25 February 2010
Revision No.3: April 2014

Geosyntec consultants

Title & Approval Sheet

Quality Assurance Project Plan
Geosyntec Consultants
MIG/DeWane Landfill Closure Project
Boone County, Belvidere, Illinois

Geosyntec Project Manager/John Seymour, PE	Date
Geosyntec Quality Assurance Manager/Chriso Petropoulou, PE	Date
IEPA Project Manager/Nicole Wilson, P.E.	Date
IEPA Quality Assurance Manager/Print & Sign Name	Date
First Environmental Laboratory Project Manager/ Neil Cleghorn	Date
First Environmental Laboratory Quality Assurance Manager/ Lorrie Walker	Date

Distribution:

1 Copy Eric Ballenger; BFINA

1 Copy Rustin Kimmel; Lathrop and Gage

2 Copies Nicole Wilson; Illinois Environmental Protection Agency (IEPA)

1 Copy Jay Timm, IEPA Community Relations Coordinator

1 Copy Site Document Repository (to Jay Timm)

1 Copy Lorrie Walker; First Environmental Laboratory QA Manager

1 Copy John Grabs; CDM Smith(IEPA Oversight)

1 Copy Howard Caine; U.S. Environmental Protection Agency

1 Copy John Seymour; Geosyntec Project Director

1 Copy Brad Bodine; Geosyntec Project Manager (electronic copy)

1 Copy Chriso Petropoulou; Geosyntec Quality Assurance Manager (electronic copy)

Geosyntec consultants

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES, continued

LIST OF APPENDICES

LIST OF ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirements
ASTM	American Society for Testing and Materials
BFINA	BFI Waste Systems of North America, LLC.
BODs	Biological Oxygen Demand
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CGI	Combustible Gas Indicator
CofCs	Contaminants of Concern
CofC	Chain of Custody
DQI	Data Quality Indicators
DQOs	Data Quality Objectives
FFS	Focused Feasibility Study
FOG	Fats Oil and Grease
FSP	Field Sampling Plan
Geosyntec	Geosyntec Consultants
GMZ	Groundwater Management Zone
HASP	Health and Safety Plan
IAC	Illinois Administrative Code
ICR	Ignitability, Corrosivity, Reactivity
IEPA	Illinois Environmental Protection Agency
IRM	Interim Remedial Measures
MLTF	MIG/DeWane Landfill Task Force
MNA	Monitoring Natural Attenuation
MS	Matrix Spike
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NPL	National Priorities List
O&M	Operation & Maintenance
OMP	Operations and Maintenance Plan
ORP	Oxidation Reduction Potential
OSHA	Occupational Health and Safety Administration
PCBs	Polychlorinated Biphenyls
PID	Photoionization Detector
PM	Project Manager
POTW	Publicly Owned Treatment Works
PRP	Potentially Responsible Party

QA	Quality Assurance
QAM	Quality Assurance Manager
QAPP	Quality Assurance Project Plan
QC	Quality Control
RD	Remedial Design
RD/RA	Remedial Design/Remedial Action
RDWP	Remedial Design Work Plan
RI	Remedial Investigation
ROD	Record of Decision
RPD	Relative Percent Difference
SOP	Standard Operating Procedures
SOW	Statement of Work
TCLP	Toxicity Characteristic Leaching Procedure
TOPP	Total Organic Priority Pollutants
TSS	Total Suspended Solids
U.S. EPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

1. PROJECT MANAGEMENT

1.1 Project/Task Organization

The Project Quality Assurance Team is shown on the Quality Assurance Organization Chart (**Figure 1-1**). The roles, relationships and lines of communications and responsibilities are defined and summarized as follows:

Illinois Environmental Protection Agency (IEPA) Project Coordinator – **Ricky Lanham**. Mr. Lanham will be the primary point of contact representing the IEPA. Mr. Lanham will coordinate quality assurance work with BFI Waste Systems of North America, LLC. (BFINA) and its Supervising Contractor, Geosyntec Consultants (Geosyntec).

BFINA Project Coordinator – **Eric Ballenger**. Mr. Ballenger will be the primary point of contact representing BFINA. Mr. Ballenger may designate certain aspects of the quality assurance work to the Supervising Contractor. BFINA's Alternate Project Coordinator is Victoria Warren.

Supervising Contractor – Geosyntec will be the principal contractor retained by BFINA to supervise the Work under the Consent Decree (CD). Geosyntec's project team is composed of the following personnel:

Senior Advisor - **Dr. Rudy Bonaparte, PE**. Dr. Bonaparte will continue to participate in the project to provide consistency with previous Geosyntec work on the project, offer input and advice to the project team.

Project Director – **Scott Luettich, PE**. Mr. Luettich will provide overall project direction and technical support to Geosyntec's project team to evaluate the work is completed in accordance with project requirements.

Project Manager – **John Seymour, PE**. Mr. Seymour will be BFINA's and IEPA's primary point of contact and manage the project, provide monthly progress reporting and coordinate data generated for review submitted to the BFINA and IEPA in accordance with the Statement of Work (SOW). Geosyntec's Alternate Project Manager is Dean LaFleur.

Mr. Seymour's specific responsibilities include the following:

- Provide overall direction and management of Geosyntec activities defined in the Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP);
- Review and analyze the performance of the implementation of the sampling program;
- Represent Geosyntec in meetings with the client and regulatory agencies;
- Coordinate and manage all subcontractors;
- Monitor project progress relative to schedule and determine corrective actions necessary to maintain schedule;
- Ensure that laboratories can meet their time/schedule commitments;
- Receipt/review and distribution of laboratory reports;
- Oversee ordering and delivering of sampling equipment and supplies;
- Prepare routine progress reports; and
- Consult with the client and recommend FSP and QAPP modifications, if necessary, to maximize data usability.

Quality Assurance Manager - **Chriso Petropoulou, PhD, PE**. Dr. Petropoulou will direct the quality assurance activities during the course of the project. She will be responsible for maintaining the official approved QAPP and provide independent review from the group generating the data. Dr. Petropoulou's specific responsibilities include:

- Review data quality objectives, set assessment criteria and conduct assessments to determine compliance;
- Review data packages from the laboratories;
- Review field sample collection forms;
- Review audit reports;
- Review data compliance with the QAPP;
- Oversight of the data verification and validation;

- Resolve laboratory questions/concerns about Standard Operating Procedures (SOP) details;

Field Investigation Site Manager – **Dean LaFleur, PE.** Mr. LaFleur will be responsible for implementing predesign investigation phase of the work included in the Remedial Design Work Plan (RDWP). Mr. LaFleur will work with the Project Managers, Quality Assurance Managers and Sampling Team to judge that work is conducted in accordance with project-specific procedures.

Analytical Laboratory Project Manager, First Environmental Laboratory, Inc. – **Bill Mottashed.** Mr. Mottashed will be responsible for supervising the analytical laboratory from sample receipt to final report preparation.

Analytical Laboratory Quality Assurance Manager, First Environmental Laboratory, Inc. – **Neil Cleghorn.** Mr. Cleghorn will be responsible for supervising the quality assurance program and certifying test results completed in accordance with this QAPP and **Appendix A.**

Geotechnical Laboratory Project Manager, Excel Geotechnical Testing Laboratory – **Allen Manizad.** Mr. Manizad will be responsible for supervising the sample receipt and analysis reporting and ensuring test results completed in accordance with this QAPP and ASTM (American Society of Testing and Materials) methods.

Geotechnical Laboratory Quality Assurance Manager, Excel Geotechnical Testing Laboratory – **Nader Rad, PhD, PE.** Dr. Rad will be responsible for supervising the quality assurance program and certifying test results completed in accordance with this QAPP and **Appendix B.**

1.2 Problem Background/Definition

1.2.1 Problem Background

The Site, also known as Boone Landfill, MIG Investment, DeWane Landfill, Bonus Landfill, or Kennedy Landfill, is located in Boone County, Illinois approximately 0.25 miles east of the City of Belvidere and 0.5 miles north of U.S Business Route 20 (**Figure 1-2**). The Site is located primarily in the south half of the southeastern quarter of Section 30, Township 44 North, Range 4 East. The Site is bounded on the north by the Chicago and Northwestern railroad tracks, and the Commonwealth Edison right-of-

way. North of the railroad tracks is an agricultural field that extends to the Kishwaukee River.

Agricultural and commercial properties are located to the east and south of the Site. A soil borrow pit, used to provide soil for the Site's interim cap, is immediately adjacent to the west of the Site. Further west of the Site is a residential housing development known as the Wycliffe Estates subdivision.

The Site occupies an area of approximately 47 acres and rises to a height of approximately 55 ft above the surrounding terrain (**Figure 1-3**). The Site consists of a landfill and leachate surface impoundment. The surface impoundment was constructed to receive leachate from the eastern area of landfill operations through a gravity flow leachate collection system. A landfill gas extraction system, composed of two vents for passive gas removal, had been installed on the crest of the landfill prior to being abandoned in 1988 by M.I.G. Investments, Inc.

The Site operated as a landfill from 1969 until 1988. The Site received residential, municipal, commercial, and industrial wastes and is classified based on United States Environmental Protection Agency (U.S. EPA) guidance as a Type I landfill. A Type I landfill is a co-disposal facility where hazardous wastes are disposed of with municipal solid wastes. At one time, the Site had a landfill permit issued by the State of Illinois for the facility.

The Site was abandoned in 1988 by a former operator prior to achieving complete final closure. U.S. EPA placed the Site on the National Priorities List (NPL) in 1990. Throughout the 1990s, a number of activities were conducted by the MIG/DeWane Landfill Task Force (MLTF), the Potentially Responsible Party (PRP) group for the Site. During the time frame up to 2000, these activities included:

- Maintenance and periodic removal of liquids from the on-site leachate impoundment;
- Placement of additional "interim remedial measures" (IRM) landfill soil cap material;
- Completion of a both the Remedial Investigation (RI) and Focused Feasibility Study (FFS);

- Installation of gas extraction wells and operation of a gas extraction system west of the landfill to alleviate concentrations of methane detected in the Wycliffe Estates subdivision; and
- Review and comment on Illinois IEPA's Proposed Plan for the Site and negotiation of a ROD and SOW in 1999 and 2000.

Since 2000, the following activities have occurred:

- From 2000 through most of 2005, BFINA obtained agreements with the other PRPs to assume primary responsibility for implementing the remedy;
- BFINA provided comments on the IEPA Draft SOW periodically through 2005. The SOW discussions successfully concluded in the summer of 2005;
- The Remedial Design/Remedial Action (RD/RA) CD was lodged with the court on January 4, 2006 and was entered on March 13, 2006; and
- BFINA proposed Mr. Eric Ballenger as the Project Coordinator and Geosyntec proposed Mr. John Seymour to represent the RD Supervising Contractor on January 11, 2006. The IEPA approved Geosyntec as the Supervising Contractor in a letter dated March 31, 2006.

The remedy for the MIG/DeWane Landfill Site is presented in Sections 2 and 3 of the SOW and is summarized below:

- Landfill Gas Management Program. The program will utilize the existing active gas extraction/collection system with atmospheric discharge and existing passive vents, as augmented with new passive vents.
- Institutional Controls, Access Restrictions and Deed Restrictions. Institutional controls will be implemented in accordance with the CD.
- Storm Water Management/Surface Water Diversion System. This system is required to manage rainfall runoff and control erosion of the cap system. Erosion control measures will be installed where necessary.
- Closure of Leachate Surface Impoundment. The existing surface impoundment will be closed, and a replacement system will be designed and installed.
- Leachate Collection and Management. The existing leachate collection system will be augmented to mitigate leachate surface seeps and reduce

hydrostatic pressure. Further, an engineering evaluation of future seep potential and a leachate head analysis will be conducted.

- Groundwater Remediation and Management. The remedy does not require an active groundwater remediation component. The remedy relies upon groundwater remediation through the use of Monitored Natural Attenuation (MNA) and other remediation components for the Site. A groundwater monitoring program will be developed and implemented to assess MNA.
- Landfill Cover/Cap. A multi-component landfill cap will be designed, constructed and maintained to meet required landfill standards and related Applicable or Relevant and Appropriate Requirements (ARARs).
- Operation and Maintenance. An appropriate program for long-term operation and maintenance of the Site will be developed and implemented. The design phase includes preparation of an Operations and Maintenance Plan (OMP).

The 2000 Record of Decision (ROD) for the MIG/DeWane Landfill documents the final.

1.2.2 Problem Definition

The overall goal of this QAPP is to generate representative data and information from pre-design phase investigation testing of leachate, soil and air sample media to effectively implement the Remedial Design (RD) of the final remedy. The sampling and analysis objectives for each of these sample media are as follows:

- Leachate: to develop an understanding of leachate quality and potential generation rate of the disposal of leachate at an off-site facility such as a local Publicly Owned Treatment Works (POTW) or permitted waste disposal facility.
- Groundwater: to evaluate current groundwater which data previously detected Site CofCs (Contaminants of Concern) above Illinois groundwater standards and in wells in the Wycliffe Estates subdivision to assess the migration of CofCs detected in 2000.
- Gas: a) to evaluate the existing gas management system (active gas extraction system and passive vents) by examination to assess the current conditions of the equipment, including the blower, piping, gas extraction wells and gas vents, b) to assess whether LFG has migrated southwest of the Landfill toward

a new subdivision, and c) assess the presence of LFG to the north, east and south of the Landfill and install Operation and Maintenance (O&M) gas monitoring wells.

- Soil: to measure physical characteristics of the existing soil cover and borrow sources to develop technical specifications for use in the new cover system.
- Air: to measure air quality parameters during the intrusive part of the pre-design investigation to protect worker health and safety in accordance with the Health & Safety Plan (HASP).

The chemicals of concern for the human health assessment conducted during the RI are described in the ROD (page 30) as follows:

Organics

Vinyl chloride	Methylene chloride	1,1-dichloroethene
1,2-dichloropropane	Trichloroethene	Benzene
Tetrachloroethene		

Inorganics

Antimony	Arsenic	Chromium
Iron	Lead	Manganese
Mercury	Nickel	Boron

The leachate contaminants of concern for the pre-design investigation addressed in this QAPP are those associated with leachate pretreatment standards for off-site leachate disposal either at a POTW or waste characterization parameters for disposal at a waste disposal facility. The contaminants of concern are listed on **Table 1.1a**.

The air contaminants of concern are those associated with the protection of human health as a result of intrusive activities into soil and waste materials and include landfill gas (primarily methane and Volatile Organic Compounds [VOCs]) and particulates.

1.3 Project/Task Description

1.3.1 Pre-Design Investigation Sampling

Leachate Sampling

The data and information to be obtained during the pre-design investigation includes the assessment of the leachate seeps on the landfill. The goals of the leachate investigation are as follows:

1. Reduce the potential for leachate pressure build up under the new cover system and outbreaks in the future by utilizing data from monitoring leachate head levels and waste hydraulic conductivity characteristics using new leachate piezometers; and

2. Assess leachate chemical characteristics and identifying pretreatment options for discharge to a local POTW or at an off-site permitted waste disposal facility. City of Belvidere and Rockford POTW ordinances are included in **Appendix C-1 and C-2**. Pretreatment requirements for an off-site waste disposal facility (Advance Waste Systems) are also presented in **Appendix C-3**. Historical leachate data are included in **Appendix D**. The leachate analytical data will be compared with ordinance requirements or waste disposal facility requirements to assess pretreatment permit requirement goals and to evaluate disposal options.

The sampling process design is detailed in Section 2.1 and summarized in this section.

Four (4) leachate samples will be collected during the pre-design phase to be representative of the landfill area for which the new cover system will be designed. The proposed leachate sampling areas will be located to represent the most practical locations for reducing leachate head within the landfill. **Figure 1-4** shows the proposed sampling locations.

Leachate sampling, analysis protocols are defined in **Table 1-1a, Table 1-1b, and Table 1-1c**. Leachate sampling will be conducted in accordance with procedures in the FSP. Analytical parameters, methods, containers, preservatives, holding times and minimum sample amounts required are shown on **Table 1-1a**. Quality assurance requirements for leachate sampling are shown on **Table 1-1b** and include parameters,

methods, and frequencies for field duplicates, trip blanks and matrix spike/matrix spike duplicate samples. A summary of laboratory analyses is presented on **Table 1-1c**.

Soil Sampling

The goals of the soil sampling are to measure soil characteristics to identify the suitability and quantity of on-site materials that may be used in the new cover system. The sampling process design is detailed in Section 2.1 and summarized in this section.

It is necessary to measure the thickness, distribution, and type of the existing cover soils to estimate the quantity that may be re-used from the existing cover. Further, site borrow sources will be evaluated through soil sampling and analyses during pre-design to assess the suitability of on-site materials for use in the new cover system.

Laboratory testing of existing cover and borrow soils will be performed to assess the physical characteristics and re-use potential for the soil. Geotechnical sampling and test methods for the landfill soil cover system and borrow soils will be conducted in accordance with **Table 1-2**. Soil physical characteristics testing parameters have been selected to meet relevant and appropriate portions of 35 Illinois Administrative Code (IAC) Part 811. Testing will include Atterberg limits, particle size analysis, moisture content, laboratory compaction, specific gravity, hydraulic conductivity and visual classifications of soils.

A summary of laboratory analysis is presented on **Table 1-1c**.

Groundwater Sampling

The goals for the groundwater sampling will be to obtain analytical testing data to evaluate the current groundwater conditions with respect to the selected remedy in the ROD. The OMP will define long-term groundwater monitoring to meet the requirements of establishment of the Groundwater Management Zone (GMZ) and 35 IAC Part 811.319 (landfill groundwater monitoring program). The OMP will be presented with the Pre-Final Remedial Design and will specify locations and frequencies of future groundwater monitoring based on this new and previous groundwater data.

The integrity of the monitoring wells will be assessed through visual observation. The adequacy of the monitoring well productivity will be assessed by purging. Water level data and time data will be collected and compared to previous well purging operations

to assess whether the productivity of the well has changed. After the data are assessed, a decision will be made regarding the need for improvement of the well productivity.

A summary of laboratory analysis is presented on **Table 1-1c**.

Gas Investigation

Eight (8) new gas probes will be installed around the perimeter of the Landfill consistent with the requirements of 35 IAC 811.310 to assess the presence of methane. The gas probes will be installed along the northern, eastern and southern perimeters. Gas probes exist along the western Site perimeter. Readings will be obtained from the probes of methane, oxygen, carbon dioxide, pressure, and temperature.

Three (3) of the new gas probes will be installed in the southwestern portion of the Landfill to assess the presence of methane between the existing gas collection trench and the new subdivision southwest of the Site. The gas probes will be located on property controlled by BFINA or the existing Site owner. The data will be evaluated during the RD to assess the need for additional monitoring to meet the requirements of 35 IAC 811.310 "Landfill Gas Monitoring".

Air Sampling

Air parameters have been selected for the protection of personnel health and safety during intrusive investigations that will occur during the pre-design investigation. Air sampling will be conducted for methane gas, total VOCs and particulates during the pre-design sampling event during intrusive work (SOW, page 17). Intrusive work will include installation of new leachate wells and completion of soil borings into the existing landfill cover for soil sampling.

1.3.2 Project Schedule

The Gantt chart of the project schedule is included with the RDWP and the durations for the pre-design sampling/analysis periods are incorporated into the QAPP schedule. The project schedule will be updated to reflect current project status in the monthly progress report.

The estimated sampling/analysis schedule is described below and provides estimated durations for the sampling event. The turnaround time for data from the date of receipt

at the laboratory is 10 working days. Sample event preparation will occur concurrently with agency review period of the RDWP, which includes this QAPP as an attachment.

Activity	Duration
Sampling Event Preparation	Concurrent w/agency review
Field Sampling Event	3 weeks
Laboratory Analysis	3 weeks
Data Review, Verification and Validation	3 weeks
Field Sampling Report	3 weeks

The results to the pre-design investigation will be documented in a report included as an attachment to the preliminary design.

1.4 Quality Objectives and Criteria

1.4.1 Purpose/Background

This section discusses the quality assurance procedures and systematic process to achieve the objectives for the analysis of sample media. This section provides the procedures that have been developed to ensure the collection of representative data. Field QC (i.e., duplicates, MS/MSD, field blanks and equipment blanks), sample collection procedures and handling are detailed in the FSP.

1.4.2 Data Quality Objectives

Data quality objectives (DQOs) are qualitative statements that specify the quality of the data required to support decisions made during field sampling activities. DQOs are based on the ultimate use of the data to be collected, so different data uses may require different levels of data quality. Three analytical levels address various data uses and QA/QC effort and methods required for this project to achieve the desired level of quality. The three levels utilized during the pre-design investigation are defined as follows:

- Level 1 (Screening) - This level provides the lowest level of data quality but the most rapid results. It is used for health and safety air monitoring at the site for initial site characterization to locate areas for more accurate analyses (i.e.,

Photoionization Detector [PID], Combustible Gas Indicator [CGI], Mini-Ram/particulates) as define in the HASP.

- Level 2 (On-site Analyses) – Level 2 provides rapid results and a better level of data quality than Level 1. This level is used for on-site measurement data and will include tests as defined in the FSP for leachate sampling and gas measurements. These types of data will be collected using a Horiba water quality measurement system, water level meter and a GEM500 gas monitor or equivalent.

- Level 3 (Off-site analysis using standard methods) – Level 3 provides data that will be used to draw conclusions concerning design parameters. Off-site analyses in the laboratories are subject to Level 3. Off-site analyses of the parameters listed on **Table 1-1a** and **Table 1-2** are subject to Level 3 DQOs.

1.4.3 Measurement Performance Criteria

Performance and acceptance criteria will be expressed in terms of data quality indicators (DQIs). The DQIs which will be used for leachate samples will be precision, bias, accuracy, representativeness, comparability, completeness and sensitivity (EPA, 2002).

Precision and accuracy will be assessed by determining the relative percent difference (RPD) of sample duplicates and matrix spike (MS) and matrix spike duplicate (MSD) samples. The project goals for precision are defined in Section 18 of First Environmental Laboratory, Inc. QAPP in **Appendix A-1**. The RPD will be calculated for each pair of duplicate analysis using the following equation:

$$RPD_{s/d} = \frac{|S-D| \times 100}{(S+D)/2}$$

Where: S = first sample value (original)

D = second sample value (duplicate)

The $RPD_{s/d}$ is the measure of precision of the results that accounts for the variability of sampling and analytical techniques. The RPD of each pair of MS/MSD samples will be calculated using the following equation:

$$RPD_{ms/msd} = \frac{|MS-MSD| \times 100}{(MS + MSD)/2}$$

The accuracy of laboratory analytical results will be assessed using the results of MS samples. The percent recovery of MS samples will be calculated using the following equation:

$$\text{Percent Recovery} = (A-B)/C \times 100$$

Where: A = analyte concentration determined experimentally from the spiked sample

B = level determined by separate analysis of unspiked sample

C = amount of the spike added

The project goals for accuracy, expressed as % recovery, are defined in Section 18 of the First Environmental Laboratory, Inc. QAPP.

Completeness is defined as a measure of the amount of valid data to be obtained from the analytical measurement system compared to the amount expected under normal conditions. The field and laboratory will provide data meeting the QA acceptance criteria that is 95 percent complete. The data completeness of laboratory analyses will be calculated by using the following equation:

% Completeness = Number of valid data/Number of samples collected for each parameter tested x 100

Sensitivity is defined as the capability of a method or instrument to discriminate between measurement responses representing different levels of interest. The laboratory will determine the minimum concentration which can be detected by an instrument (detection limit). Detection limits are shown on tables included in **Appendix A-2**.

Representativeness is a qualitative term used to express the degree to which data accurately and precisely represent a characteristic of a population. The procedures for collecting the samples were designed to provide data representative of the site conditions. Representative sample locations were determined based on existing landfill seep locations, RI/FFS data and engineering judgment. Representativeness will be

achieved by adhering to the procedures in the FSP, including specified sampling techniques, analytical procedures, and holding times.

Comparability is a qualitative term used to express the confidence with which one data set can be compared to another. Comparability of new data will be assessed by the analysis of duplicate samples and tests obtained under the same conditions. The extent to which existing/old data and new data can be compared will depend on the similarity of sampling and analytical methods and QC objectives used for the old data and new data; if the sampling and analytical and QC objectives are not similar between the data, then conclusions from the data may not be appropriate.

1.5 Special Training/Certification

1.5.1 Purpose/Background

Geosyntec will utilize qualified laboratories and trained personnel with experience on previous Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) projects.

1.5.2 Training

Project staff working at the MIG/DeWane Landfill remedial design and the laboratories must meet the applicable Occupational Health and Safety Administration (OSHA) health and safety training requirements for field personnel and provide training documentation prior to working on-site.

1.5.3 Certifications

Records documenting compliance with OSHA requirements as described in the HASP for field work will be kept on file at Geosyntec's office in Chicago, Illinois. First Environmental Laboratory Inc.'s IEPA Certification and analytical testing certification documentation is included in **Appendix A-3.**

1.6 Documents and Records

1.6.1 Purpose/Background

Documentation shall be controlled by each person and maintained in central project files located in Geosyntec's Chicago Office. Communications for team members will typically be through Geosyntec's Project Manager (PM). Project documents will be retained by the Supervising Contractor for a minimum of 10 years as defined in Article 25 of the CD.

Each QAPP will be numbered and assigned to the QAPP holder. The PM will keep a log of those parties holding a QAPP. After the QAPP is issued and each time a revision or clarification to the QAPP is issued, the PM will require a return receipt certifying that the QAPP holder received the new QAPP document.

1.6.2 Information in Reporting Packages

Information to be included in reporting packages will include field records, sample collection records, Chain of Custody (CofC) forms, QA sample records, general field procedures, corrective action reports, laboratory reports, sample data, sample management records, test methods, QA/QC reports and data handling records.

1.6.3 Data Reporting Package Format and Documentation Control

Quality assurance report format, control and clarifications will be completed and authorized by the QAM and PM. The PM will keep final hard copies and electronic files in the project file. The hard copy and electronic files should have similar folder/section numbering. Final documents issued by the QAM will be stored in its original form (Microsoft Word, Excel, etc.) and as an image file using Adobe Acrobat. Project files will be retained 10-years in accordance with Article 25 of the CD.

1.6.4 Data Reporting Package Archiving and Retrieval

Data reporting package archiving and retrieval will be done by the PM or his/her designee. The archive file will be initially setup in the Chicago office of Geosyntec and final document retention will be determined during project closeout. The PM will retrieve documents from the project file for staff or project use during the project.

2. DATA GENERATION AND AQUISITION

2.1 Sampling Process Design

This QAPP and FSP identify the requirements for field and laboratory sample collection and testing for leachate, groundwater, gas, soil and air monitoring during the pre-design sampling. A summary of laboratory analysis is presented on Table 1-1c. The sampling scheme is shown on **Table 2-1** and describes the decision making process for sampling methods, techniques and data collection activities for analytical, geotechnical and air sampling.

The selection of leachate locations was based on the location of existing seeps. Three locations were selected along the northern side of the landfill and one was selected along the southern side because there are significantly more seeps along the northern side. The depth of the sample locations (the depth of screens of new leachate piezometers) was selected to ensure leachate will be encountered in waste and to assess the waste characteristics that could cause the build up of leachate and cause seeps.

The leachate analytical parameters were selected based on parameters in POTW pretreatment ordinances and off-site waste disposal facility requirements in **Appendix C-1**. For comparison, historical leachate data are included in **Appendix D**. The grab samples will be collected from each of the four leachate piezometers to allow an evaluation of data variability. One composite sample will be prepared from the four piezometers for Toxicity Characteristic Leaching Procedure (TCLP) analysis as an indicator of whether the leachate that will be collected in a new leachate collection system tank could be a hazardous waste.

Soil sample locations were based upon the area of the IRM cover and potential soil borrow area locations and considered soil data collected in the RI/FFS and IRM cover construction. The depths of soil samples were selected based on the thickness of the existing IRM cover and expected depths of suitable soils in borrow areas.

The soil analytical parameters were selected based on the requirements of 35 IAC Part 811. The number of samples was selected to assess test data variability.

Groundwater samples will be collected at select locations to assess changes in groundwater conditions since the last round of groundwater monitoring conducted in early 2000. To meet the objective, groundwater will be monitored in wells that have

previously detected Site CofCs above Illinois groundwater standards, and in wells in the Wycliffe Estates subdivision to assess the migration of CofCs detected in 2000. The locations of monitoring wells and gas probes are presented on Figure 1-4 (Revised). Prior to conducting groundwater monitoring, water levels will be obtained in all monitoring wells and select gas probes.

New gas probes will be installed around the perimeter of the Landfill consistent with the requirements of 35 IAC 811.310 to assess the presence of methane. The new gas probes will be installed along the northern, eastern and southern perimeters. Gas probes already exist along the western Site perimeter. Readings will be obtained from the probes of methane, oxygen, carbon dioxide, pressure, and temperature. The data will be evaluated during the RD to assess the need for additional monitoring to meet the requirements of 35 IAC 811.310 "Landfill Gas Monitoring".

The air sample locations were selected based on the requirement of the SOW to test air during intrusive waste investigations; consequently, air testing will be required where waste is encountered during soil drilling and sampling. Air sample parameters were selected based on the protection of personnel health and safety.

2.2 Sampling Methods

Sampling media will include leachate, soil and air samples. The field sampling team will use sampling and field screening methods in accordance with the FSP, HASP and this QAPP.

The leachate grab samples will be collected from four well locations. One composite leachate sample will be collected for TCLP testing. This TCLP composite sample will be collected from the thoroughly mixed purged well waters from the four new leachate well locations.

Groundwater grab samples will be collected from eight (8) well locations using a bladder pump, tubing or bailers. Gas sampling will be obtained during field screening using field equipment.

Gas sampling will be obtained during field screening using field equipment. Gas readings will be obtained using a GEM500 gas monitor during the work for methane, oxygen, carbon dioxide, pressure, and temperature.

The soil samples will be grab samples collected from the existing landfill cover and borrow areas. Soils sample collection will be done in accordance with the FSP.

2.3 Sample Handling and Custody Procedure

Samples will be collected in individual sample containers and identified with a unique identification label. The sample designation will be in accordance with Section 4 of the FSP. Sample labels will include the following general information:

- Project identification;
- Sample identification (sample location, date and time of collection in accordance with Section 4 of the FSP);
- Sampler's name or initials;
- Preservatives added (if any); and
- Required analytical or geotechnical test method.

Labeling will be done using indelible/waterproof ink and errors will be crossed out with a single line, dated, and initialed. An example label is presented in **Appendix E**.

After labeling, analytical samples will be stored in ice-filled cooler chests until shipment to the laboratory. Fresh ice will be placed in coolers prior to shipment. Typically, the samples will be packed for shipment at the end of the work day.

Analytical sample bottles will be wrapped in bubble pack to prevent breakage during shipment and placed in insulated shipping coolers with ice in plastic bags. Analytical CofC forms describing the contents of the cooler will be placed in a sealed bag inside the sample coolers.

The shipping coolers will be sealed to prevent leakage of melting ice and affixed with security labels taped over opposite ends of the lid. The coolers will be custody sealed and shipped by overnight delivery to the analytical laboratory and the laboratory will be notified of the overnight shipment.

Geotechnical samples will be stored in a secure, locked area until transmitted to the testing laboratory. The natural moisture content of soil samples will be preserved by placement of all samples in sealed containers, such as Zip Lock® freezer bags, jars with

waxed lids, and plastic buckets with rubber or similar seals under the lids. The samples will not be required to be preserved with ice and will not be allowed to freeze if collected during freezing weather.

The field sampling task leader will be responsible for overseeing and supervising the implementation of proper sample custody procedures in the field. The task leader will also be designated as the field sample custodian and is responsible for custody until the samples have been transferred to a courier or to the laboratory. Shipping bills of lading will be kept until the laboratory receives the samples.

Both analytical and geotechnical samples will be maintained under CofC procedures. Examples of CofC, sample shipping container seals, laboratory sample log and sample collection forms are included in **Appendix E**. Sample custody procedures will be used to ensure that samples are obtained from the project location and reach the laboratory without alteration. A sample is considered to be in a person's custody if the sample is in a person's possession, locked in a container so that no one can tamper with it, or placed in a secured area which is restricted to authorized personnel.

Each laboratory's QAM or his/her designee will check incoming samples for integrity and note observations on the original CofC form at the laboratory upon receipt. Each sample will be logged into the laboratory system by assigning it a unique laboratory sample number in accordance with laboratory procedures. This number and the field sample identification number will be recorded on the laboratory report. The laboratory will keep a file of documents (i.e., CofC Records) pertinent to sample custody and sample analysis protocol. The laboratory will keep a copy and the completed original CofC form will be returned as a part of the final analytical report to Geosyntec. This record will be used to document sample custody transfer from the sampler to other personnel or the laboratory.

2.4 Analytical Methods Requirements

The leachate and groundwater samples will be tested in accordance with **Tables 1-1a, Table 1-1b and Table 1-1c**. On-site testing will be conducted in accordance with the field testing procedures defined in this QAPP and equipment instructions included in **Appendix F**. Soil testing methods are included on **Table 1-2**.

2.5 Quality Control

QC procedures involve control of field operations, sampling methods, and analytical procedures to ensure that each field team member and analytical laboratories are familiar with the QAPP requirements. Implementation of the QC procedures will be established through the following steps:

Ensuring that each field team member is familiar with the provisions of the RDWP which contain the FSP, QAPP and HASP. The Geosyntec PM will ensure that each field team member is familiar with the RDWP prior to the implementation of field activities.

Providing a QA review of field activities to ensure that all procedures are followed. Also, the Geosyntec PM will check entries into field notebooks and forms on a regular basis.

Ensuring that adequate and appropriate field and laboratory QC samples are collected, prepared and analyzed. Sections 2.5.1 and 2.5.2 summarize field and laboratory QC samples.

2.5.1 Field QC Samples

The field QC checks will consist of field and trip blanks, duplicates, and matrix spikes. **Table 1-1a** and **Table 1-1b** define the quantities and frequencies for leachate field QC samples, respectively. If required control limits are exceeded, corrective actions will be addressed or the sampling event may be repeated if necessary. Field testing procedures and measurements are also defined on **Table 2-1** and the FSP.

2.5.2 Laboratory QC Samples

The laboratory will perform quality control procedures that are required by the analytical and geotechnical methods defined in the Laboratory QAPP included in First **Appendix A** (First Environmental Laboratory, Inc.) and **Appendix B** (Excel Geotechnical Testing Laboratory), respectively.

MSs are used to determine the effect of the matrix on a method's recovery efficiency. The MS will be prepared in First Environmental laboratory by adding a known mass of target analyte to a specified amount of matrix sample for which an independent analyte

concentration is available. The analytical laboratory will spike samples for each analyte in accordance with spiking concentration levels included in **Appendix A-2**.

The MSD is a second replicate matrix spike prepared in the laboratory and analyzed to obtain a measure of the precision of the recovery for each analyte.

The laboratories will implement the corrective actions required if the quality control criteria are exceeded. Data that do not meet the internal QC criteria will be flagged and the laboratory will prepare a nonconformance memorandum documenting a description of and the reason for the nonconformance. Laboratory Quality Control Limits and Detection Limits are defined in **Appendix A-2**.

The analytical laboratory's QC samples (i.e., reagent blank, method blank, surrogate, lab standards, etc.) and their purpose are defined in Section 20 of the QAPP in **Appendix A-2**.

A summary of quality control analyses is presented on **Table 1-1c**.

2.6 Instrument/Equipment Testing, Inspection, and Maintenance

Laboratory equipment testing, inspection, maintenance and repair will be performed for each instrument in accordance with procedures defined in **Appendix A** and **B**.

Field equipment maintenance will be done in accordance with the manufacturer's calibration procedures, and frequency, criteria and field user manuals are provided in **Appendix F**. Preventive maintenance for the field equipment includes general inspection before use, cleaning as necessary during use, and thorough cleaning and inspection after use. Rechargeable batteries are checked before use and recharged after use. For equipment using disposable batteries, replacement batteries will be stocked. Maintenance and repairs will occur when corrective action needs are identified. The instrument will be replaced if it cannot be repaired or recalibrated in a timely manner.

2.7 Instrument/Equipment Calibration and Frequency

Laboratory instruments will be calibrated on a regular basis as defined in the QAPP and SOP for analytical and geotechnical laboratories included in **Appendix A-1** and **B**, respectively.

Geosyntec field personnel will calibrate, operate and maintain field sampling and testing equipment daily during sampling events. A water level meter, Horiba U-20XD water quality meter or equal will be used and operation instructions are included in **Appendix F**. Air will be sampled in accordance with the HASP for health and safety and not investigation purposes. Leachate and groundwater field measurements will include pump rate, purge volume, temperature, conductivity, pH, dissolved oxygen, oxidation reduction potential (ORP) and turbidity. Calibration records for laboratory and field equipment will be kept in the project files. Gas monitoring equipment will be calibrated each day the equipment is used.

2.8 Inspection/Acceptance of Supplies and Consumables

The team leaders will be responsible for ordering and maintaining supplies during the project. The team leaders will inventory supplies on a regular basis for the work to be completed timely and with minimal delays. Supplies for sampling leachate will include sample containers, coolers, labels, custody seals, ice and personal protective equipment. The laboratory will supply certified clean sample containers and the team leader will inspect supplies prior to the sampling event. The team leader or designee will identify samples from each of the four (4) locations, track, store and ship these samples to the laboratory in accordance with this QAPP.

The team leader will be keep supply and reference standards for calibrating instrumentation on-site during the sampling event should the need arise.

2.9 Non-direct Measurements

Previous leachate, groundwater, gas, soil and air sampling laboratory test results collected at the MIG/DeWane Landfill during the RI/FFS will be used in the decision-making processes for this project. Some of previous reports completed for the MIG/DeWane Landfill which will be used are the IRM Final Construction Report, RI, FFS, and Gas Extraction System Construction Completion Report. The reports are listed in Section 5 of this QAPP and historical leachate data are included in **Appendix D**.

2.10 Data Management

The data management process will be supervised by Geosyntec's QAM and PM. Standard record keeping procedures and document control will be achieved with the laboratory transmitting data the Geosyntec's PM for data logging, storage, retrieval and security which will be central filed in Geosyntec's Chicago office. Both the analytical and geotechnical laboratories will provide Geosyntec hard copy and electronic file formats. To the greatest extent practicable, electronic copies of documents and data will be maintained in the project file in Geosyntec's Chicago office. Electronic files are backed up daily.

Data generated during performance of the work will undergo two levels of review - one at the laboratory and one after the data is received by Geosyntec.

Geosyntec's PM and QAM will manage, review and handle the data. The QAM or designee will review the raw data from the laboratory to detect and correct possible errors and loss during the data processing in conjunction with the field sampling team. The field sampling team will assist the PM and QAM to verify sample CofCs, quantities, tests requested, preservative, holding times, delivery, etc., for any possible errors or corrective measures required during the process.

Documents containing data will be controlled by the PMs. Documents will be kept in final hard/paper copy and, as much as possible, electronically, in the project file. The hard copy file and electronic file will have the same folder/section numbering. Final documents will be stored in its original form (Microsoft Word, Excel, etc.) and as an image file using Adobe Acrobat.

3. ASSESSMENT AND OVERSIGHT

3.1 Assessment and Response Actions

The implementation of this QAPP will be supervised by Geosyntec's QAM and PM, and both laboratory QAMs. Geosyntec and both laboratories will utilize qualified team members for all aspects of the project. These efforts will be documented in laboratory reports, field logbooks daily field reports, CofCs and other project documentation.

Geosyntec's QAM will review and verify the results of the most recent laboratory audit and make appropriate adjustments prior to initiation of the pre-design sample testing by the laboratory. In the event significant deficiencies are found during the review of audit results, additional measures may be taken by Geosyntec's QAM and could result in utilizing a different laboratory.

Self-assessment of the laboratories will be performed by the laboratory's QAMs and can include review of laboratory QAPPs, laboratory audits, reanalyzing samples to verify results, recalibrating equipment or evaluating and amending analytical procedures as necessary or acknowledging the level of uncertainty and flagging the data.

Field activities will be assessed by Geosyntec's PM or designee (i.e., sampling team leader) to monitor activities such as amending sampling procedures, accepting or rejecting samples, and document deviations from the FSP and QAPP. Geosyntec's QAM or designee may perform an independent assessment of the field, laboratory or data management activities during the performance of the work to check procedures and documentation for compliance with this QAPP. The results of this independent assessment will be transmitted to Geosyntec's PM and the agencies.

The laboratory will perform quality control procedures that are required by the analytical methods defined in this QAPP. The laboratory will implement the corrective actions required if the quality control criteria are exceeded. Data that do not meet the internal QC criteria will be flagged and the laboratory will prepare a nonconformance memorandum documenting a description of and the reason for the nonconformance.

3.2 Reports to Management

The Laboratory QAMs will review the laboratory reports and submit them to Geosyntec's QAM or designee on a timely basis. Reports may include, but are not limited to, laboratory reports, assessment reports, audit reports and corrective action documentation.

Geosyntec's QAM or designee will review the laboratory reports and prepare a Quality Assurance Report that will be submitted to Geosyntec's PM. These Quality Assurance Reports will be submitted to the agencies and provide project status.

4. DATA VALIDATION AND RECONCILIATION WITH USER REQUIREMENTS

4.1 Data Review, Verification and Validation

This section defines the criteria to accept, reject or qualify project information to be obtained during the project. The final checks will be done on the information obtained to decide if the data obtained satisfies the quality criteria defined in this QAPP.

Data validation is an analyte and sample-specific process to determine the quality of a specific data set relative to the end use and verification is typically done first.

The laboratory data reviewer will verify that the appropriate analytical method is followed, detection limits are correct and the data are calculated properly. Unused portions of samples will be kept for 30-days after issuing the applicable analytical report and disposed in accordance with laboratory procedures or by returning the sample to Geosyntec to be disposed of on-site.

4.1.1 Data Validation of Field Activities

The validation of the verified data using field documentation will involve the following steps (EPA, 2001):

Evaluate field documents for consistency;

Review QC procedures; and

Summarize sampling deviations and determine impact on data quality.

4.1.2 Data Validation of Analytical Laboratory Activities

The validation of the analytical laboratory data involves the following steps (EPA, 2001):

- Review data verification documentation including methods and QC requirements;
- Review data qualifiers;

- Assign data qualifiers;
- Review raw data, including results of QC checks, units of measure, sample method detection limits, sample analysis dates;
- Review summary of problems encountered and corrective actions; and
- Review QC data (MS, MDS, duplicates, and blanks).

4.2 Data Verification

The QAM or his/her designee will be responsible for overseeing the verification of laboratory data. For the pre-design investigation, which is limited to leachate analysis, one hundred (100) percent of the Level 3 data will be verified by comparing raw data to the reported results to determine if the reported results are accurate. The results of the calibration and internal QA/QC checks will be compared with the project acceptance criteria to assess the usefulness of the data.

The data verification process involves the review of the following records (EPA, 2001):

- Sample collection;
- Sample receipt;
- Sample preparation;
- Sample analysis; and
- Documentation review.

The data verification process involves checking the accuracy of the algorithms used in the calculations and a verification of a number of raw data calculations. Verified data will be checked for a variety of factors including transcription of dilution factors, correct application of conversion factors, etc. Verified data will also include laboratory qualifiers if assigned.

4.3 Reconciliation with User Requirements

Technical staff and project personnel are responsible for reporting suspected technical issues, QC nonconformance or suspected deficiencies to Geosyntec's QAM or PM. The QAM or his/her designee will be responsible for assessing the problems in consultation with Geosyntec's PM. If it is determined the situation warrants a reportable nonconformance requiring corrective action, then a nonconformance report will be started by Geosyntec's QAM or PM.

The QAM or his/her designee will be responsible for ensuring that corrective actions for nonconformance are started to address evaluating reported nonconformance, determining action to be taken, reviewing nonconformance reports and corrective actions taken, checking additional work for nonconforming items and reports included in the project files.

Corrective action for the laboratory measurements may be required during the project. Problems may occur during testing and sampling that will necessitate the implementation of corrective action. Corrective action may include repeating the measurement to check the error, checking calibration, recalibrating, replacing the instrument, repeating the test or stopping the work if necessary.

5. 2010 QAPP ADDENDUM

This Revision No. 2 presents the 2010 addendum and addresses the following additional work:

- Resampling and analyzing leachate from four leachate piezometers to obtain additional leachate characterization data to facilitate agreement with the City of Belvidere Publicly Owned Treatment Works (POTW);
- Installing gas probes to further define the extent of methane southwest of the landfill and east of the landfill; and
- Obtaining groundwater monitoring data on all wells to identify changes in groundwater to design a quarterly monitoring program.

The following sections provide updated information for 2010.

5.1 2010 Project/Task Organization

The Project Quality Assurance Team is shown on the Quality Assurance Organization Chart (**Figure 5-1**). The roles, relationships and lines of communications and responsibilities are defined and summarized as follows:

Illinois Environmental Protection Agency (IEPA) Project Coordinator – **Ricky Lanham**. Mr. Lanham will be the primary point of contact representing the IEPA. Mr. Lanham will coordinate quality assurance work with BFI Waste Systems of North America, LLC. (BFINA) and its Supervising Contractor, Geosyntec Consultants (Geosyntec).

BFINA Project Coordinator – **Eric Ballenger**. Mr. Ballenger will be the primary point of contact representing BFINA. Mr. Ballenger may designate certain aspects of the quality assurance work to the Supervising Contractor. BFINA's Alternate Project Coordinator is Victoria Warren.

Supervising Contractor – Geosyntec will be the principal contractor retained by BFINA to supervise the Work under the Consent Decree (CD). Geosyntec's project team is composed of the following personnel:

Senior Advisor - **Dr. Rudy Bonaparte, PE.** Dr. Bonaparte will continue to participate in the project to provide consistency with previous Geosyntec work on the project, offer input and advice to the project team.

Project Director – **Scott Luettich, PE.** Mr. Luettich will provide overall project direction and technical support to Geosyntec's project team to evaluate the work is completed in accordance with project requirements.

Project Manager – **John Seymour, PE.** Mr. Seymour will be BFINA's and IEPA's primary point of contact and manage the project, provide monthly progress reporting and coordinate data generated for review submitted to the BFINA and IEPA in accordance with the Statement of Work (SOW). Geosyntec's Alternate Project Manager is Burak Tanyu. Mr. Seymour's specific responsibilities include the following:

- Provide overall direction and management of Geosyntec activities defined in the Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP);
- Review and analyze the performance of the implementation of the sampling program;
- Represent Geosyntec in meetings with the client and regulatory agencies;
- Coordinate and manage all subcontractors;
- Monitor project progress relative to schedule and determine corrective actions necessary to maintain schedule;
- Ensure that laboratories can meet their time/schedule commitments;
- Receipt/review and distribution of laboratory reports;
- Oversee ordering and delivering of sampling equipment and supplies;
- Prepare routine progress reports; and
- Consult with the client and recommend FSP and QAPP modifications, if necessary, to maximize data usability.

Quality Assurance Manager - **Chriso Petropoulou, PhD, PE, BCEE.** Dr. Petropoulou will direct the quality assurance activities during the course of the project. She will be responsible for maintaining the official approved QAPP and provide independent review from the group generating the data. Dr. Petropoulou's specific responsibilities include:

- Review data quality objectives, set assessment criteria and conduct assessments to determine compliance;
- Review data packages from the laboratories;
- Review field sample collection forms;
- Review audit reports;
- Review data compliance with the QAPP;
- Oversight of the data verification and validation;
- Resolve laboratory questions/concerns about Standard Operating Procedures (SOP) details;

Field Investigation Site Manager – **Dave Zolp.** Mr. Zolp will be responsible for implementing site investigation phase of the work included in the revised Remedial Design Work Plan (RDWP). Mr. Zolp will work with the Project Managers, Quality Assurance Managers and Sampling Team to judge that work is conducted in accordance with project-specific procedures.

Analytical Laboratory Project Manager and Quality Assurance Manager, First Environmental Laboratory, Inc. – **Neil Cleghorn**. Mr. Cleghorn will be responsible for supervising the quality assurance program and certifying test results completed in accordance with this QAPP and **Appendix G**. Mr. Cleghorn will also be responsible for supervising the analytical laboratory from sample receipt to final report preparation.

5.2 Problem Background/Definition

The problem background and definition are described in Section 1.2.1 and 1.2.2, respectively, of this QAPP.

5.3 Project Task Description

5.3.1 Investigation Sampling

Leachate Sampling

The goals of the leachate investigation are to verify leachate chemical characteristics to facilitate an agreement with the City of Belvidere Publicly Owned Treatment POTW for discharge. The city of Belvidere POTW ordinance is included in **Appendix C-1**. Four (4) leachate samples will be collected during the investigation to be representative of the landfill area for which the new cover system will be designed Leachate piezometers (LP-01, -02, -03 and -04) will be sampled and analyzed for the same characterization analytes and POTW parameters completed in 2006 (see **Figure 5-2**).

Leachate sampling, analysis protocols are defined in **Table 5-1a, Table 5-1b,** and **Table 5-1c**. Leachate sampling will be conducted in accordance with procedures in the FSP. Analytical parameters, methods, containers, preservatives, holding times and minimum sample amounts required are shown on **Table 5-1a**. Quality assurance requirements for leachate sampling are shown on **Table 5-1b** and include parameters, methods, and frequencies for field duplicates, trip blanks and matrix spike/matrix spike duplicate samples. A summary of laboratory analyses is presented on **Table 5-1c**.

Groundwater Sampling

An interim groundwater monitoring program was presented in a 27 July 2009 letter to the Illinois Environmental Protection Agency. The interim monitoring program includes 5-years of annual monitoring at the Site. All 25 monitoring well locations will be sampled for parameters listed in 35 IAC Part 724.195 Appendix I (see **Figure 5-2**) during the first annual monitoring event. The results from the initial monitoring event will be used to determine which wells will be monitored in subsequent quarterly monitoring events.

Water level data and time data will be collected and compared to previous well purging operations to assess whether the productivity of the well has changed. After the data are assessed, a decision will be made regarding the need for improvement of the well productivity.

A summary of laboratory analysis is presented on **Table 5-1c**.

Gas Probe Installation

Two to four gas probes will be installed to further define the extent of methane. One to two gas probes will be installed east of GP-28 along the site perimeter fence. One to two gas probes will be installed southwest of GP-30 and north of the wetland area.

Gas from the gas probes will be tested in the field using a LandTec GEM 2000 or similar equipment. Oxygen, methane (to calculate the lower explosive limit) and carbon dioxide will be tested. A pressure reading will be obtained in the field at least one day after the probe is installed and prior to taking the readings. After the pressure reading, oxygen, methane and carbon dioxide will be measured in the field.

5.3.2 2010 Project Schedule

The project schedule for the 2010 investigation activities is currently in development.

5.4 Quality Objectives and Criteria

The quality objectives and criteria for the 2010 field investigation are the same as discussed in section 1.4.3 of this QAPP. However updated versions of the First Environmental Laboratory, Inc. documentation, including the Laboratory QAPP, is included in **Appendix G**.

5.5 Sampling Process Design

This QAPP and FSP identify the requirements for field and laboratory sample collection and testing for leachate and groundwater during the investigation. A summary of laboratory analysis is presented on **Table 5-1c**. The sampling scheme is shown on **Table 5-2**.

Four (4) leachate samples will be collected during the investigation to be representative of the landfill area for which the new cover system will be designed Leachate piezometers (LP-01, -02, -03 and -04) will be sampled and analyzed for the same characterization analytes and POTW parameters completed in 2006.

Groundwater samples will be collected at all accessible monitoring well locations in accordance with the interim groundwater monitoring program. Prior to conducting groundwater monitoring, water levels will be obtained in all monitoring wells.

5.6 Sampling Methods

The field sampling team will use sampling and field screening methods in accordance with the FSP, HASP and this QAPP.

5.7 Sample Handling and Custody Procedure

Samples will be collected in individual sample containers and identified with a unique identification label. The sample designation will be in accordance with the FSP and Section 2.3 of this QAPP.

5.8 Analytical Methods Requirements

The leachate and groundwater samples will be tested in accordance with **Tables 5-1a, Table 5-1b** and **Table 5-1c**.

5.9 Quality Control

QC procedures are discussed in Section 2.5 of this QAPP.

5.9.1 Field QC Samples

The field QC checks will consist of field and trip blanks, duplicates, and matrix spikes. **Table 5-1a** and **Table 5-1b** define the quantities and frequencies for leachate field QC samples, respectively. If required control limits are exceeded, corrective actions will be addressed or the sampling event may be repeated if necessary. Field testing procedures are defined in the FSP.

5.9.2 Laboratory QC Samples

The laboratory will perform quality control procedures that are required by the analytical methods defined in the Laboratory QAPP included in **Appendix G** and as described in Section 2.5.2 of this QAPP.

A summary of quality control analyses is presented on **Table 5-1c**.

5.10 Instrument/Equipment Testing, Inspection, and Maintenance

Laboratory equipment testing, inspection, maintenance and repair will be performed as discussed in Section 2.6 of this QAPP.

5.11 Instrument/Equipment Calibration and Frequency

Laboratory instruments will be calibrated on a regular basis as defined in the Section 2.7 of this QAPP.

5.12 Inspection/Acceptance of Supplies and Consumables

The team leaders will be responsible for ordering and maintaining supplies during the project. The team leaders will inventory supplies on a regular basis for the work to be completed timely and with minimal delays. Supplies for sampling leachate and groundwater will include sample containers, coolers, labels, custody seals, ice and personal protective equipment. The laboratory will supply certified clean sample containers and the team leader will inspect supplies prior to the sampling event. The team leader or designee will identify samples from each location, track, store and ship these samples to the laboratory in accordance with this QAPP.

The team leader will be keep supply and reference standards for calibrating instrumentation on-site during the sampling event should the need arise.

5.13 Data Management

Data management is discussed in Section 2.9 of this QAPP.

5.14 Assessment and Oversight

Assessment and oversight are discussed in Section 3 of this QAPP.

5.15 Data Validation and Reconciliation with User Requirements

Data validation and reconciliation with user requirements are discussed in Section 4 of this QAPP.

6. 2014 QAPP ADDENDUM

This Revision No. 3 presents the 2014 addendum and addresses quality assurance for the Remedial Design, Remedial Action, and for the Long-Term landfill gas and groundwater monitoring at the MIG/DeWane Landfill Superfund Site. Specific tasks addressed in the 2014 QAPP Addendum are:

- Sampling of leachate to prepare a discharge application for hauling and discharge of leachate to the Rock River Water Reclamation District (RRWRD). Routine sampling of leachate will be conducted by the RRWRD following approval of a discharge permit;
- Landfill gas monitoring at perimeter gas probes and at dual phase (leachate and landfill gas) extraction probes and gas vents on the top and side slopes of the landfill, in accordance with the IEPA-approved current monitoring program;
- Long-term groundwater monitoring for Target VOC and inorganic parameters;
- Long-term groundwater monitoring for full Appendix I (35 IAC 724.195) parameters; and
- Soil confirmation sampling from the bottom of the leachate impoundment, following removal of impacted soil and sediment.

The following sections provide updated information for 2014.

6.1 2014 Project/Task Organization

The Project Quality Assurance Team is shown on the Quality Assurance Organization Chart (**Figure 6-1**). The roles, relationships and lines of communications and responsibilities are defined and summarized as follows:

IEPA Project Coordinator – **Nicole Wilson, P.E.** Ms. Wilson will be the primary point of contact representing the IEPA. Ms. Wilson will coordinate quality assurance work with BFINA and its Supervising Contractor, Geosyntec Consultants (Geosyntec).

BFINA Project Coordinator – **Eric Ballenger**. Mr. Ballenger will be the primary point of contact representing BFINA. Mr. Ballenger may designate certain aspects of the

quality assurance work to the Supervising Contractor. BFINA's Alternate Project Coordinator is Victoria Warren.

Supervising Contractor – Geosyntec will be the principal contractor retained by BFINA to supervise the Work under the CD. Geosyntec's project team is composed of the following personnel:

Senior Advisor - **Dr. Rudy Bonaparte, PE**. Dr. Bonaparte will continue to participate in the project to provide consistency with previous Geosyntec work on the project, offer input and advice as necessary to the project team.

Project Director – **John Seymour, PE**. Mr. Seymour will provide overall project direction and technical support to Geosyntec's project team to ensure the work is completed in accordance with project requirements.

Project Manager – **Brad Bodine, PE**. Mr. Bodine will be BFINA's and IEPA's primary point of contact and will manage the project, provide monthly progress reporting and coordinate data generated for review submitted to the BFINA and IEPA in accordance with the SOW. Mr. Bodine's specific responsibilities include the following:

- Provide overall direction and management of Geosyntec activities defined in the Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP);
- Review and analyze the performance of the implementation of the sampling programs;
- Represent Geosyntec in meetings with the client and regulatory agencies;
- Coordinate and manage all subcontractors;
- Monitor project progress relative to schedule and determine corrective actions necessary to maintain schedule;
- Ensure that laboratories can meet their time/schedule commitments;
- Receipt/review and distribution of laboratory reports;
- Oversee ordering and delivering of sampling equipment and supplies;
- Prepare routine progress reports; and

- Consult with the client and recommend QAPP modifications, if necessary, to maximize data usability.

Quality Assurance Manager - **Julia Klens Caprio**. Ms. Caprio will direct the quality assurance activities during the course of the project. She will be responsible for maintaining the official approved QAPP and provide independent review from the group generating the data. Ms. Caprio's specific responsibilities include:

- Review data quality objectives, set assessment criteria and conduct assessments to determine compliance;
- Review data packages from the laboratories;
- Review field sample collection forms;
- Review audit reports;
- Review data compliance with the QAPP;
- Oversight of the data verification and validation;
- Resolve laboratory questions/concerns about Standard Operating Procedures (SOP) details;

Remedial Action Construction Site Manager –The RA Construction Site Manager will be responsible for implementing the Remedial Action construction phase of the work included in the Remedial Action Work Plan (RAWP). The RA Construction Site Manager will work with the Project Managers, Quality Assurance Managers, and Construction Subcontractors to judge that work is conducted in accordance with project-specific procedures.

Analytical Laboratory Project Manager, First Environmental Laboratory, Inc. – **Neil Cleghorn**. Mr. Cleghorn will be responsible for supervising the analytical laboratory from sample receipt to final report preparation.

Quality Assurance Manager, First Environmental Laboratory, Inc. – **Lorrie Walker**. Ms. Walker will be responsible for supervising the quality assurance program and certifying test results completed in accordance with this QAPP and First Environmental Laboratory, Inc.'s QAPP (see **Appendix H)**.

6.2 Problem Background/Definition

The problem background and definition are described in Section 1.2.1 and 1.2.2, respectively, of this QAPP. In addition to the activities discussed in Section 1, the following activities have occurred:

- The RDWP was submitted to IEPA and U.S. EPA on 19 May 2006, and, subsequently the 1 September 2006 revised RDWP was approved by IEPA on 25 October 2006.
- Pre-design Investigation field work was conducted from 13 November through 8 December 2006.
- In a 13 June 2008 letter to IEPA, BFINA proposed to install the gas wells and vents in 2008 and outlined a plan for their installation. IEPA provided comments on the plan on 26 June 2008 and BFINA responded on 16 July 2008. The plan was approved in a letter dated 3 November 2008 and construction was allowed to commence. The goal of this project was to create additional gas venting over the existing soil cover to contain and remediate gasses generated from the site. The intent of constructing the wells and vents in 2008 is to (i) expedite venting of landfill gas to mitigate the presence of methane in gas probes (GP) GP-27, GP-28 and GP-30; and (ii) shorten the construction schedule for the remaining remedial action construction work.
- Geosyntec, on behalf of BFINA, has conducted quarterly landfill gas monitoring since 2008 in accordance with the IEPA-approved Interim Landfill Gas Monitoring Program.
- Geosyntec, on behalf of BFINA, has conducted semi-annual groundwater sampling since 2010 in accordance with the IEPA-approved Interim Groundwater Monitoring Program.
- IEPA approved a Modified Remedy, consisting of improvements to the existing IRM landfill cover, as documented in the IEPA Explanation of Significant Difference (ESD) dated July 2013 and approved by IEPA and USEPA in August 2013. All other portions of the remedy remain the same as described in Sections 2 and 3 of the SOW.

The remedy for the MIG/DeWane Landfill Site, which is presented in Sections 2 and 3 of the SOW and the ESD approved in August 2013, is summarized below:

- Landfill Gas Management Program. The program will utilize the existing active gas extraction/collection system with atmospheric discharge and existing passive vents, as augmented with new passive vents.
- Institutional Controls, Access Restrictions and Deed Restrictions. Institutional controls will be implemented in accordance with the CD.
- Storm Water Management/Surface Water Diversion System. This system is required to manage rainfall runoff and control erosion of the cap system. Erosion control measures will be installed where necessary.
- Closure of Leachate Surface Impoundment. The existing surface impoundment will be closed.
- Leachate Collection and Management. The existing leachate collection system will be augmented to mitigate leachate surface seeps and reduce hydrostatic pressure. Further, an engineering evaluation of future seep potential and a leachate head analysis will be conducted.
- Groundwater Remediation and Management. The remedy does not require an active groundwater remediation component. The remedy relies upon groundwater remediation through the use of Monitored Natural Attenuation (MNA), establishment of a Groundwater Management Zone (GMZ), and other remediation components for the Site. A groundwater monitoring program will be developed and implemented to assess MNA.
- Landfill Cover/Cap. As documented in the ESD approved in August 2013, the Modified Landfill Cover/Cap Remedy consists of improvements to the existing IRM landfill cover to be designed, constructed and maintained to meet required landfill standards and related ARARs.
- Operation and Maintenance. An appropriate program for long-term operation and maintenance of the Site will be developed and implemented. The design phase includes preparation of an Operations and Maintenance Plan (OMP).

The 2000 Record of Decision (ROD) for the MIG/DeWane Landfill and the ESD approved in August 2013 document the final remedy for the site.

6.3 Project Task Description

6.3.1 Investigation Sampling

Leachate Sampling

The goals of the leachate investigation are to verify leachate chemical characteristics to prepare a Discharge Permit Application for submittal to the Rock River Water Reclamation District (RRWRD). The RRWRD ordinance is included in **Appendix I**. Four (4) leachate samples will be collected to prepare a composite representative of the landfill area for which the leachate extraction system will be constructed. Leachate piezometers (LP-01, -02, -03 and -04) will be sampled and analyzed for the requested characterization parameters (see **Figure 6-2**). Based on information from Alice Ohrtmann of the RRWRD Industrial Waste Surveillance department, RRWRD would collect and analyze all permit compliance samples on behalf of the generator, and associated costs are included in the wastewater disposal fees. Ms. Ohrtmann indicated that permit compliance sampling would be required at least weekly initially, then at reduced frequency if the analytical results are consistently acceptable to RRWRD. RRWRD would be responsible for any QA/QC requirements for the compliance sampling.

Leachate sampling and analysis protocols are defined in **Table 6-1a and Table 6-1b**. Leachate sampling will be conducted in accordance with procedures in the IEPA-approved Field Sampling Plan (FSP), as amended in February 2010. Analytical parameters, methods, containers, preservatives, holding times and minimum sample amounts required are shown on **Table 6-1a**. Quality assurance requirements for leachate sampling are shown on **Table 6-1b** and include parameters, methods, and frequencies for field duplicates, trip blanks and matrix spike/matrix spike duplicate samples.

Groundwater Monitoring

Details regarding the long-term groundwater monitoring program will be presented in the Operations and Maintenance (O&M) Plan for the Site. The following paragraphs provide information regarding sampling and analysis protocols for: 1) full Appendix I (35 IAC 724.195) groundwater sampling, and 2) target COC groundwater sampling, which are discussed in Section 2.6 of the SOW.

Groundwater sampling and analysis protocols for full Appendix I (35 IAC 724.195) groundwater sampling are defined in **Table 6-2a and Table 6-2b**. Groundwater sampling will be conducted in accordance with procedures in the IEPA-approved FSP, as amended in February 2010. Analytical services will be provided by First Environmental Laboratory, with a standard turnaround time (e.g., 10-day TAT). Analytical parameters, methods, containers, preservatives, holding times and minimum sample amounts required for full Appendix I (35 IAC 724.195) groundwater sampling are shown on **Table 6-2a**. Quality assurance requirements for full Appendix I (35 IAC 724.195) groundwater sampling are shown on **Table 6-2b** and include parameters, methods, and frequencies for field duplicates, trip blanks and matrix spike/matrix spike duplicate samples.

Groundwater sampling and analysis protocols for target COC groundwater sampling are defined in **Table 6-3a and Table 6-3b**. Groundwater sampling will be conducted in accordance with procedures in the IEPA-approved FSP, as amended in February 2010. Analytical services will be provided by First Environmental Laboratory, with a standard turnaround time (e.g., 10-day TAT). Analytical parameters, methods, containers, preservatives, holding times and minimum sample amounts required for target COC groundwater sampling are shown on **Table 6-3a**. Quality assurance requirements for target COC groundwater sampling are shown on **Table 6-3b** and include parameters, methods, and frequencies for field duplicates, trip blanks and matrix spike/matrix spike duplicate samples.

Semi-annual groundwater sampling will be continued through the completion of construction in accordance with the proposed Interim Groundwater Monitoring Program, described in the July 2010 proposal, which IEPA gave approval to commence. The long-term groundwater monitoring program will be outlined in the Draft Operation and Maintenance Plan (O&M Plan). The final O&M Plan with a complete long-term groundwater monitoring program will be submitted after (or during) construction and prior to the pre-final construction inspection. The long-term groundwater monitoring program shall be implemented after construction. The criteria acceptable to Illinois EPA to adjust the monitoring program will also be defined in the final O&M Plan.

Gas Probe and Gas Vent Monitoring

To evaluate the effectiveness of the landfill control systems, quarterly landfill gas monitoring of the perimeter and off-site landfill gas probes listed in **Table 6-4** will initially be conducted during the Long-Term Monitoring Program. Quarterly landfill

gas monitoring will be conducted at the gas collection monitoring locations along the gas collection trench and at the blower (see **Table 6-4**). In addition, the gas vents on the surface of the landfill will be monitoring on an annual basis. The landfill gas probes and gas vents to be sampled are shown in **Figure 6-3**.

Impoundment Closure Soil Confirmation Sampling

Following the removal of at least two (2) feet of soil and sediments from the bottom of the surface impoundment, discrete soil samples will be collected from the bottom of the empty surface impoundment to confirm impacted soil and sediment has been removed. Soil samples will be collected from any areas where visual or olfactory observations indicate the potential for residual impact. Up to six (6) soil samples will be collected, at the discretion of the field sampling personnel, from the bottom and sides of the former surface impoundment.

Soil confirmation samples will be analyzed for the following parameters:

- VOCs, including the target VOC list, by USEPA SW-846 Method 8260B; and
- Total metals and mercury, including target inorganic compounds antimony, arsenic, chromium, iron, lead, manganese, mercury, nickel, and boron, by USEPA SW-846 Methods 6010/6020 and 7471B.

The soil confirmation sampling analytical results will be compared to the Tiered Approach to Corrective Action Objectives (TACO) Tier 1 Industrial Soil Remedial Objectives in accordance with Title 35 of the Illinois Administrative Code, Part 742.

New, unused nitrile gloves will be worn at each separate sampling point. Soil samples for VOC analysis will be collected and preserved in accordance with USEPA Method SW-846 5035 using Terra Core (or equivalent) sampling containers.

Analytical services will be provided by First Environmental Laboratory, with a rush turnaround time (e.g., 24-hour or 2-day TAT). Following receipt of analytical results indicating all soil and sediment impacted at concentrations exceeding TACO Tier 1 Industrial Remedial Objectives have been removed from the former surface impoundment, the empty surface impoundment will be filled with clean soil and graded as necessary to avoid ponding.

6.3.2 Remedial Action Project Schedule

The project schedule for the 2014 remedial action construction activities is discussed in the Remedial Design report and the Remedial Action Work Plan.

6.4 Quality Objectives and Criteria

The quality objectives and criteria for the 2014 field investigation are consistent with Section 1.4.3 of this QAPP. An updated version of the First Environmental Laboratory, Inc. documentation, including the Laboratory QAPP, is included in **Appendix H**.

6.5 Sampling Process Design

This QAPP identify the requirements for field and laboratory sample collection and testing for leachate, landfill gas, and groundwater during the remedial action and long-term monitoring. A summary of laboratory analysis is presented on **Tables 6-1b, 6-2a**, and **6-3a**.

Four (4) leachate samples will be collected to prepare a composite representative of the landfill area for which the leachate extraction system will be constructed. Leachate piezometers (LP-01, -02, -03 and -04) will be sampled and analyzed for the requested characterization parameters (see **Figure 6-2**). The four leachate piezometers were installed during the Remedial Design field investigation, at locations with evidence of seeps from the landfill. The piezometers have been used to evaluate leachate conditions in the waste, including leachate liquid levels and concentrations of potential contaminants.

Groundwater samples will be collected at long-term monitoring well locations as discussed in the O&M Plan. Prior to conducting groundwater monitoring, static water levels will be obtained in all monitoring wells.

6.6 Sampling Methods

The field sampling team will use sampling and field screening methods in accordance with the FSP, HASP, and this QAPP.

6.7 Sample Handling and Custody Procedure

Samples will be collected in individual sample containers and identified with a unique identification label. The sample designation will be in accordance with the FSP and Section 2.3 of this QAPP. Sample designations for the impoundment closure soil confirmation sampling will include "ICC" (impoundment closure confirmation) as the sample type and will include reference to the sampling location within the impoundment bottom (e.g., north edge, south edge, bottom center).

6.8 Analytical Methods Requirements

The leachate samples will be tested in accordance with **Tables 6-1a** and **Table 6-1b**.

For full Appendix I (35 IAC 724.195) sampling, the groundwater samples will be tested in accordance with **Tables 6-2a** and **Table 6-2b**.

For target COCs sampling, the groundwater samples will be tested in accordance with **Tables 6-3a** and **Table 6-3b**.

6.9 Quality Control

QC procedures are discussed in Section 2.5 of this QAPP.

6.9.1 Field QC Samples

The field QC checks will consist of equipment and trip blanks, duplicates, and matrix spikes. **Table 6-1b** defines the quantities and frequencies for leachate field QC samples. **Table 6-2b** defines the quantities and frequencies for groundwater field QC samples, for full Appendix I (35 IAC 724.195) groundwater sampling. **Table 6-3b** defines the quantities and frequencies for groundwater field QC samples, for target COC groundwater sampling. If required control limits are exceeded, corrective actions will be addressed or the sampling event may be repeated if necessary. Field testing procedures are defined in the FSP.

QC samples will also be collected during the impoundment closure soil confirmation sampling, including one duplicate, one MS and one MSD, and one or more trip blank samples.

6.9.2 Laboratory QC Samples

The laboratory will perform quality control procedures that are required by the analytical methods defined in the Laboratory QAPP included in **Appendix H** and as described in Section 2.5.2 of this QAPP.

A summary of quality control analyses for leachate sampling, full Appendix I (35 IAC 724.195) groundwater sampling, and target COC groundwater sampling are presented in **Table 6-1b**, **Table 6-2b**, and **Table 6-3b**, respectively.

6.10 Instrument/Equipment Testing, Inspection, and Maintenance

Laboratory equipment testing, inspection, maintenance and repair will be performed as discussed in Section 2.6 of this QAPP.

6.11 Instrument/Equipment Calibration and Frequency

Laboratory instruments will be calibrated on a regular basis as defined in the Section 2.7 of this QAPP.

6.12 Inspection/Acceptance of Supplies and Consumables

The team leaders will be responsible for ordering and maintaining supplies during the project. The team leaders will inventory supplies on a regular basis for the work to be completed timely and with minimal delays. Supplies for sampling leachate and groundwater will include sample containers, coolers, labels, custody seals, ice and personal protective equipment. The laboratory will supply certified clean sample containers and the team leader will inspect supplies prior to the sampling event. The team leader or designee will identify samples from each location, track, store, and ship these samples to the laboratory in accordance with this QAPP.

The team leader will be keep supply and reference standards for calibrating instrumentation on-site during the sampling event should the need arise.

6.13 Data Management

Data management is discussed in Section 2.9 of this QAPP.

6.14 Assessment and Oversight

Assessment and oversight are discussed in Section 3 of this QAPP.

6.15 Data Validation and Reconciliation with User Requirements

Data validation and reconciliation with user requirements are discussed in Section 4 of this QAPP.

7. REFERENCES

Preparing Perfect Project Plans, 1989, EPA/600/9-89/087

Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, 1988, EPA

EPA Requirements for Quality Assurance Project Plans, December 2002, EPA QA/R-5

EPA Guidance on Environmental Data Verification and Data Validation, June 2001, EPA QA/G-8

Construction Activities - Interim Remedial Measures, March 1993, MIG/DeWane Landfill, prepared by Golder Associates (2 volumes)

Final Remedial Investigation Report, July 11, 1997, MIG/DeWane Landfill, prepared by Clayton Environmental Consultants, Inc. (5 volumes)

Final Focused Feasibility Study, February 1, 1999, MIG/DeWane Landfill, prepared by Clayton Environmental Consultants, Inc. (3 volumes)

Gas Extraction System Construction Completion Report, July 1999, MIG/DeWane Landfill, prepared by Clayton Environmental Consultants

Groundwater/Soil-Gas Sampling Report, July 14, 2000, MIG/DeWane Landfill, prepared by Clayton Group Services, Inc.

Final Construction Report, dated March 1993, Construction Activities, Interim Remedial Measures, MIG/DeWane Landfill, Belvidere, Illinois prepared by Golder Associates, Inc. (2 volumes)

Remedial Design Work Plan, MIG/DeWane Landfill Superfund Site, Boone County, Belvidere, Illinois, Geosyntec Consultants, May 19, 2006 (contains Field Sampling Plan – FSP, Health & Safety Plan – HASP and this QAPP)

Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), ASTM D2488-90

Standard Guide for Field Logging of Subsurface Explorations of Soil and Rock, ASTM D5434-97

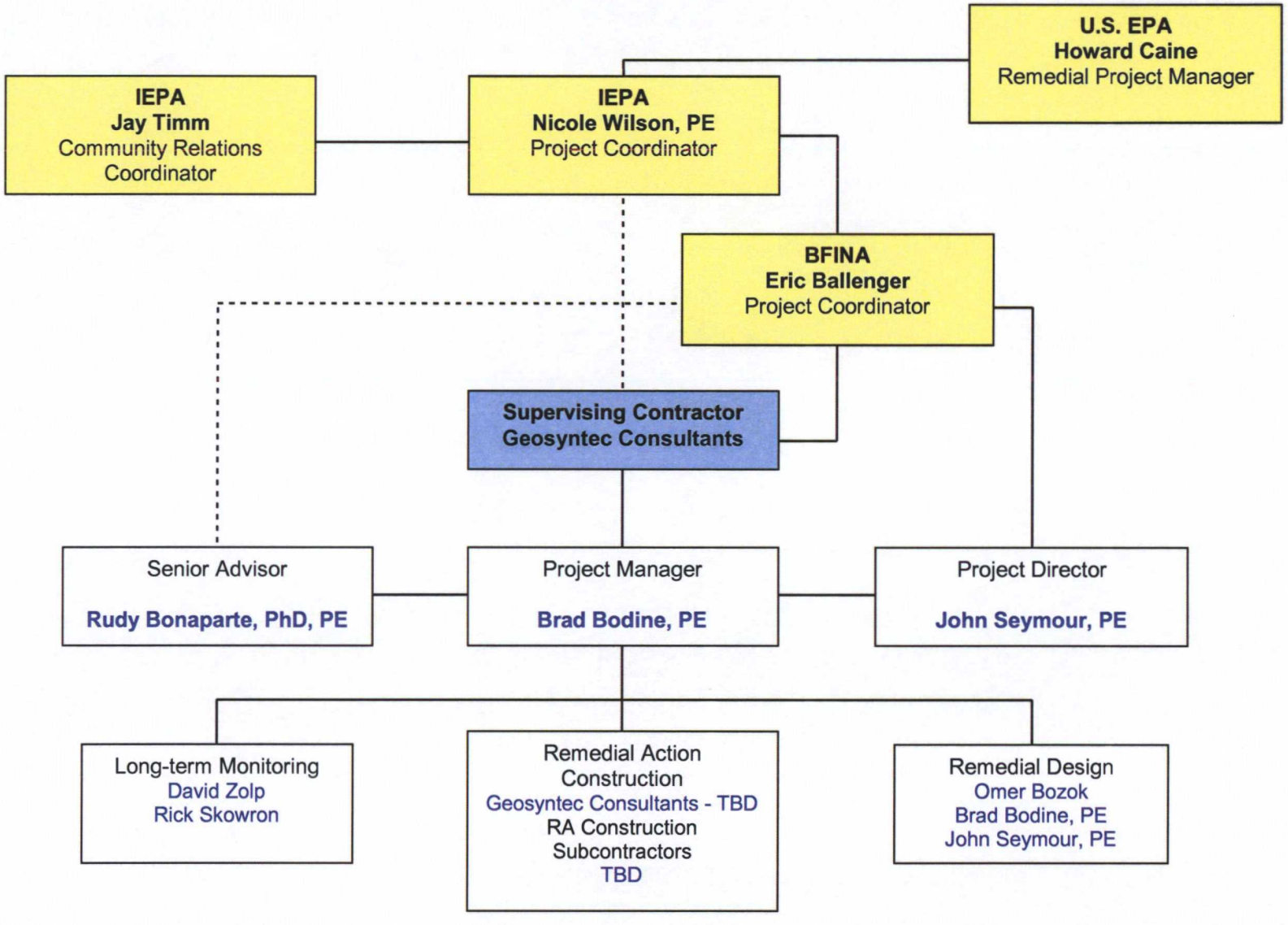
Standard Guide for Direct Push Soil Sampling for Environmental Site Characterizations, ASTM D6282-98

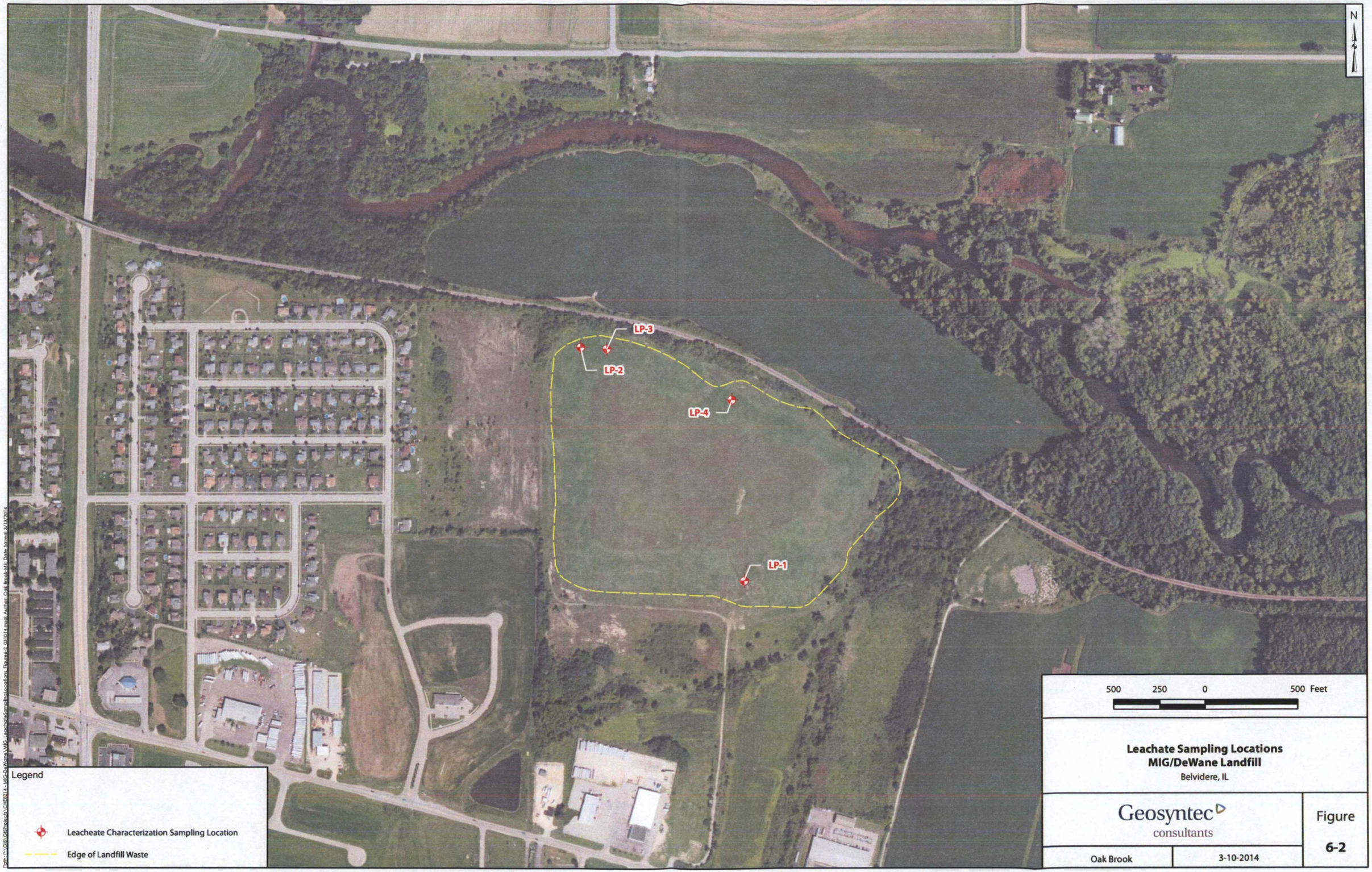
FIGURES

Figure 6-1

2014 QUALITY ASSURANCE ORGANIZATION CHART

MIG/DeWane Landfill Remedial Design
Belvidere, Illinois





Leachate Sampling Locations
MIG/DeWane Landfill
Belvidere, IL

Geosyntec consultants

Oak Brook | 3-10-2014

Figure **6-2**

Path: P:\GIS\GISProjects\LCHE\2014 - MIG-DeWane\MIG_LeachateSampleLocations_Figure6-2_031014.mxd Author: Oak Brook-MS Date Saved: 3/13/2014

Gas Probe and Gas Vent Locations
MIG/DeWane Landfill

Belvidere, IL

Geosyntec consultants

Chicago | November, 2013

Figure **6-3**

Path: H:\GIS\GIS\Projects\CitiFB\14 - MIG-DeWane\MIG Quarterly\GisMaps\mxd\ Author: Chicago\jb Date Saved: 2/1/2012 11:40:27 AM

TABLES

TABLE 6-1a
Methods, Container, Preservation, Holding Time and Sample Volume Requirements
for Leachate Characterization and Compliance Sampling
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Analytical Parameters	Analytical Methods	Containers	Preservatives	Holding Times	Minimum Sample Volume Required
POTW Composite					
Organics					
VOCs [1]	EPA 624	40 mL glass, VOA in triplicate with Teflon-lined Septa	HCl to pH<2, Cool to 4°C	14 days	3 - 40 mL vials
SVOCs	EPA 625	1 L Amber Glass with Teflon-lined lid	Cool to 4°C	Extraction, 14 days Analysis, 40 days	1 L
Pesticides & PCBs	EPA 608	1 L Amber Glass with Teflon-lined lid	Cool to 4°C	Extraction, 14 days Analysis, 40 days	1 L
Phenols (grab)	MCAWW 420.1	250 mL Glass with Teflon-lined lid	H2SO4 to pH<2, Cool to 4°C	28 days	100 mL
Unfiltered Metals	MCAWW 200.7	250 mL Plastic or Glass (all metals in one container)	HNO3 to pH<2, Cool to 4°C	6 months	100 mL
Antimony					
Arsenic					
Barium					
Cadmium					
Chromium, total					
Copper					
Iron, total					
Lead					
Manganese					
Molybdenum					
Nickel					
Selenium					
Silver					
Zinc					
Chromium, hexavalent	SW-846 7196A	250 mL Plastic or Glass	Cool to 4°C	24 hours	100 mL
Mercury	MCAWW 245.1	250 mL Plastic or Glass	HNO3 to pH<2, Cool	28 days	100 mL

TABLE 6-1a
Methods, Container, Preservation, Holding Time and Sample Volume Requirements
for Leachate Characterization and Compliance Sampling
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Analytical Parameters	Analytical Methods	Containers	Preservatives	Holding Times	Minimum Sample Volume Required
Inorganics					
Fluoride	MCAWW 340.2	250 mL Plastic	Cool to 4°C	28 days	1 L
Chloride	MCAWW 325.3				
Phosphorus	MCAWW 365.1	500 mL Plastic or Glass	H2SO4 to pH<2, Cool to 4°C	28 days	100 mL
Ammonia-N	MCAWW 350.1	250 mL Plastic	H2SO4 to pH<2, Cool to 4°C	28 days	100 mL
Cyanide, total	MCAWW 335.2	250 mL Plastic	NaOH to pH>12; Cool to 4°C	14 days	100 mL
Other					
FOG (grab)	MCAWW 1664A	1 L Amber Glass with Teflon-lined lid	H2SO4 to pH<2, Cool to 4°C	28 days	500 mL
Non-polar FOG					
Polar FOG					
pH	MCAWW 150.1	250 mL Plastic	Cool to 4°C	Immediate	100 mL
BOD_5	MCAWW 405.1	500 mL Plastic or Glass	Cool to 4°C	48 hours	200 mL
COD	MCAWW 405.4	500 mL Plastic or Glass	H2SO4 to pH<2, Cool to 4°C	28 days	100 mL
Total Suspended Solids (TSS)	MCAWW 160.2	960 mL Plastic	Cool to 4°C	7 days	200 mL

Notes:
BOD = Biochemical Oxygen Demand
COD = Chemical Oxygen Demand
SVOCs = Semi-Volatile Organic Compounds
PCBs = Polychlorinated biphenyls
VOCs = Volatile Organic Compounds
FOG = Fats, Oils & Grease

(1) Leachate POTW Compliance Sampling includes VOCs analysis, including 1,1,1-Trichloroethane, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, 1,1-Dichloroethane, 1,1-Dichloroethene, 1,2-Dichloroethane, 1,2-Dichloropropane, Benzene, Bromomethane, Carbon tetrachloride, Chlorobenzene, Chloroethane, Chloroform, Chloromethane, Ethyl benzene, Methylene chloride, Tetrachloroethene, Toluene, trans-1,2-Dichloroethene, Trichloroethene, Vinyl chloride.

TABLE 6-1b
Quality Control Sample Requirements for Leachate and Groundwater Samples
MIG/DeWane Landfill Superfund Site
Belvidere, Illinois

Geosyntec consultants

Analytical Parameters	Analytical Methods	Field Quality Control Samples			MS/MSD[1]	Total Number of Field Investigation Samples	Total Number of Samples Including QC Samples
		Field Duplicates	Trip Blanks	Equipment Blank			
		Frequency	Frequency	Frequency	Frequency		
POTW Composite							
Organics							
SVOCs	EPA 625	N/A	N/A	N/A	N/A	1	1
Pesticides & PCBs	EPA 608	N/A	N/A	N/A	N/A	1	1
VOCs	EPA 624	N/A	N/A	N/A	N/A	1	1
Phenols (grab)	MCAWW 420.1	N/A	N/A	N/A	N/A	1	1
Unfiltered Metals	MCAWW 200.7	N/A	N/A	N/A	N/A	1	1
Antimony							
Arsenic							
Barium							
Cadmium							
Chromium, total							
Copper							
Iron, total							
Lead							
Manganese							
Molybdenum							
Nickel							
Selenium							
Silver							
Zinc							
Chromium, hexavalent	SW-846 7196A	N/A	N/A	N/A	N/A	1	1
Mercury	MCAWW 245.1	N/A	N/A	N/A	N/A	1	1
Inorganics							
Fluoride	MCAWW 340.2	N/A	N/A	N/A	1 per 20 samples	1	3
Chloride	MCAWW 325.3						
Phosphorus	MCAWW 365.1	N/A	N/A	N/A	N/A	1	1
Ammonia-N	MCAWW 350.1	N/A	N/A	N/A	N/A	1	1
Cyanide, total	MCAWW 335.2	N/A	N/A	N/A	N/A	1	1
Other							
FOG (grab)	MCAWW 1664A	N/A	N/A	N/A	1 per 20 samples	1	3
Non-polar FOG							
Polar FOG							
pH	MCAWW 150.1	N/A	N/A	N/A	N/A	1	1
BOD_5	MCAWW 405.1	N/A	N/A	N/A	N/A	1	1
COD	MCAWW 405.4	N/A	N/A	N/A	N/A	1	1
Total Suspended Solids (TSS)	MCAWW 160.2	N/A	N/A	N/A	N/A	1	1

Notes:
1. MS/MSD samples are investigative samples on which the additional MS and MSD analyses are performed.

BOD = Biochemical Oxygen Demand
COD = Chemical Oxygen Demand
VOCs = Volatile Organic Compounds
SVOCs = Semi-Volatile Organic Compounds
PCBs = Polychlorinated biphenyls
FOG = Fats, Oils & Grease

TABLE 6-2a
Methods, Container, Preservation, Holding Time and Sample Volume Requirements
for Appendix I (35 IAC 724.195) Groundwater Monitoring
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Analytical Parameters	Analytical Methods	Containers	Preservatives	Holding Times	Minimum Sample Volume Required
Organics					
VOCs [1],[2]	SW-846 8260B	40 mL glass, VOA in triplicate with Teflon-lined Septa	HCl to pH<2, Cool to 4°C	14 days	3 - 40 mL vials
SVOCs, including Semi Volatile Pesticides[3]	SW-846 8270C	1 L Amber Glass with Teflon-lined lid	Cool to 4°C	Extraction, 14 days Analysis, 40 days	1 L
Pesticides & PCBs[4]	SW-846 8081A/8082	1 L Amber Glass with Teflon-lined lid	Cool to 4°C	Extraction, 14 days Analysis, 40 days	1 L
Herbicides[5]	SW-846 8321A	1 L Amber Glass with Teflon-lined lid	Cool to 4°C	7 days	1 L
Dioxins, Low Resolution					
PCDD and PCDF[6]	SW-846 8280	1 L Amber Glass with Teflon-lined lid	Cool to 4°C	45 days	2 - 1 L Amber Glass

TABLE 6-2a
Methods, Container, Preservation, Holding Time and Sample Volume Requirements
for Appendix I (35 IAC 724.195) Groundwater Monitoring
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Analytical Parameters	Analytical Methods	Containers	Preservatives	Holding Times	Minimum Sample Volume Required
Unfiltered Metals[7][8]					
Antimony, total	SW-846 6010B	500 mL Polyethylene (all metals in one container)	HNO_3 to pH<2, Cool to 4°C	180 days	100 mL
Arsenic, total					
Boron, total					
Barium, total					
Beryllium, total					
Cadmium, total					
Chromium, total					
Cobalt, total					
Copper, total					
Iron, total					
Lead, total					
Manganese, total					
Nickel, total					
Selenium, total					
Silver, total					
Thallium, total					
Tin, total					
Vanadium, total					
Zinc, total					
Mercury, total	SW-846 7470A			28 days	100 mL
Inorganics[8]					
Cyanide, total	SW-846 9010B/9014	250 mL Plastic	NaOH to pH>12; Cool to 4°C	14 days	100 mL
Sulfide	SM4500 2C	250 mL Plastic	NaOH to pH>12; Cool to 4°C	7 days	250 ml

TABLE 6-2a
Methods, Container, Preservation, Holding Time and Sample Volume Requirements
for Appendix I (35 IAC 724.195) Groundwater Monitoring
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Analytical Parameters	Analytical Methods	Containers	Preservatives	Holding Times	Minimum Sample Volume Required
Field Water Quality Measurements					
pH	Field Measurement using multi-parameter meter and flow-cell				
Specific Conductance					
Temperature					
Turbidity					
Redox Potential					
Dissolved Oxygen					

Notes:
PCDDs = Polychlorinated dibenzo-p-dioxins
PCDFs = Polychlorinated dibenzofurans
VOCs = Volatile Organic Compounds
SVOCs = Semi-Volatile Organic Compounds
PCBs = Polychlorinated biphenyls

(1) Interim Groundwater Sampling Program includes all 7 VOCs specified in the ROD: benzene; 1,1-dicholorethylene; 1,2-dichloropropane; methylene chloride; tetrachloroethylene; trichloroethylene; and vinyl chloride.

(2) Appendix I (35 IAC 724.195) parameters include additional VOC analysis: Acetone, Acetonitrile, Acrolein, Acrylonitrile, Allyl chloride, Benzene, Benzyl alcohol, Bromodichloromethane, Bromoform, Carbon disulfide, Carbon tetrachloride, Chlorobenzene, Chloroethane, Chloroform, Chloroprene, Dibromochloromethane, 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, Dichlorobenzenes (o,m,p), trans-1,4-Dichloro-2-butene, Dichlorodifluoromethane, 1,1-DCA, 1,2-DCA, 1,1-DCE, trans-1,2-DCE, 1,2-dichloropropane, cis-1,3-dichloropropene, trans-1,3-dichloropropene, 1,4-dioxane, ethylbenzene, ethyl methacrylate, hexachlorobutadiene, hexachloroethane, 2-hexanone, isobutyl alcohol, methacylonitrile, Bromomethane, Chloromethane, Dibromomethane, Methylene chloride, 2-butanone, Iodomethane, methyl methacrylate, 4-methyl-2-pentanone, naphthalene, nitrobenzene, N-nitroso-di-n-butylamine, pentachloroethane, propionitrile, pyridine, styrene, 1,1,1,2-tetrachloroethane, 1,1,2,2-tetrachloroethane, PCE, toluene, o-Toluidine, 1,2,4-trichlorobenzene, 1,1,1-TCA, 1,1,2-TCA, TCE, Trichlorofluoromethane, 1,2,3-Trichloropropane, vinyl acetate, vinyl chloride, and xylenes (o,m,p).

TABLE 6-2a
Methods, Container, Preservation, Holding Time and Sample Volume Requirements
for Appendix I (35 IAC 724.195) Groundwater Monitoring
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Analytical Parameters	Analytical Methods	Containers	Preservatives	Holding Times	Minimum Sample Volume Required
Organics					
VOCs [1],[2]	SW-846 8260B	40 mL glass, VOA in triplicate with Teflon-lined Septa	HCl to pH<2, Cool to 4°C	14 days	3 - 40 mL vials
SVOCs, including Semi Volatile Pesticides[3]	SW-846 8270C	1 L Amber Glass with Teflon-lined lid	Cool to 4°C	Extraction, 14 days Analysis, 40 days	1 L
Pesticides & PCBs[4]	SW-846 8081A/8082	1 L Amber Glass with Teflon-lined lid	Cool to 4°C	Extraction, 14 days Analysis, 40 days	1 L
Herbicides[5]	SW-846 8321A	1 L Amber Glass with Teflon-lined lid	Cool to 4°C	7 days	1 L
Dioxins, Low Resolution					
PCDD and PCDF[6]	SW-846 8280	1 L Amber Glass with Teflon-lined lid	Cool to 4°C	45 days	2 - 1 L Amber Glass

Unfiltered Metals[7][8]					
Antimony, total	SW-846 6010B	500 mL Polyethylene (all metals in one container)	HNO_3 to pH<2, Cool to 4°C	180 days	100 mL
Arsenic, total					
Boron, total					
Barium, total					
Beryllium, total					
Cadmium, total					
Chromium, total					
Cobalt, total					
Copper, total					
Iron, total					
Lead, total					
Manganese, total					
Nickel, total					
Selenium, total					
Silver, total					
Thallium, total					
Tin, total					
Vanadium, total					
Zinc, total					
Mercury, total	SW-846 7470A			28 days	100 mL
Inorganics[8]					
Cyanide, total	SW-846 9010B/9014	250 mL Plastic	NaOH to pH>12; Cool to 4°C	14 days	100 mL
Sulfide	SM4500 2C	250 mL Plastic	NaOH to pH>12; Cool to 4°C	7 days	250 ml

Field Water Quality Measurements					
pH	Field Measurement using multi-parameter meter and flow-cell				
Specific Conductance					
Temperature					
Turbidity					
Redox Potential					
Dissolved Oxygen					

Notes:

PCDDs = Polychlorinated dibenzo-p-dioxins
PCDFs = Polychlorinated dibenzofurans
VOCs = Volatile Organic Compounds
SVOCs = Semi-Volatile Organic Compounds
PCBs = Polychlorinated biphenyls

(1) Interim Groundwater Sampling Program includes all 7 VOCs specified in the ROD: benzene; 1,1-dicholorethylene; 1,2-dichloropropane; methylene chloride; tetrachloroethylene; trichloroethylene; and vinyl chloride.

(2) Appendix I (35 IAC 724.195) parameters include additional VOC analysis: Acetone, Acetonitrile, Acrolein, Acrylonitrile, Allyl chloride, Benzene, Benzyl alcohol, Bromodichloromethane, Bromoform, Carbon disulfide, Carbon tetrachloride, Chlorobenzene, Chloroethane, Chloroform, Chloroprene, Dibromochloromethane, 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, Dichlorobenzenes (o,m,p), trans-1,4-Dichloro-2-butene, Dichlorodifluoromethane, 1,1-DCA, 1,2-DCA, 1,1-DCE, trans-1,2-DCE, 1,2-dichloropropane, cis-1,3-dichloropropene, trans-1,3-dichloropropene, 1,4-dioxane, ethylbenzene, ethyl methacrylate, hexachlorobutadiene, hexachloroethane, 2-hexanone, isobutyl alcohol, methacylonitrile, Bromomethane, Chloromethane, Dibromomethane, Methylene chloride, 2-butanone, Iodomethane, methyl methacrylate, 4-methyl-2-pentanone, naphthalene, nitrobenzene, N-nitroso-di-n-butylamine, pentachloroethane, propionitrile, pyridine, styrene, 1,1,1,2-tetrachloroethane, 1,1,2,2-tetrachloroethane, PCE, toluene, o-Toluidine, 1,2,4-trichlorobenzene, 1,1,1-TCA, 1,1,2-TCA, TCE, Trichlorofluoromethane, 1,2,3-Trichloropropane, vinyl acetate, vinyl chloride, and xylenes (o,m,p).

(3) Appendix I (35 IAC 724.195) parameters include SVOC analysis, including Acenaphthene, Acenaphthylene, Acetophenone, 2-Acetylaminofluorene, 4-Aminobiphenyl, Aniline, Anthracene, Aramite, Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Bis(2-chloroethoxy)methane, Bis(2-chloroethyl) ether, Bis(2-ethylhexyl) phthalate, 4-Bromophenyl phenyl ether, Butyl benzyl phthalate, 4-Chloroaniline, 4-Chloro-3-methylphenol, 2-Chloronaphthalene, 2-Chlorophenol, 4-Chlorophenyl phenyl ether, Chrysene, 2-Methylphenol, 3-Methylphenol, 4-Methylphenol, Dibenz(a,h)anthracene, Dibenzofuran, Di-n-butyl phthalate, 3,3'-Dichlorobenzidine, 2,4-Dichlorophenol, 2,6-Dichlorophenol, Diethyl phthalate, Thionazine, Dimethoate, Dimethylaminoazobenzene, 7,12-Dimethylbenz(a)-anthracene, 3,3'-Dimethylbenzidine, α,α-Dimethylphenethylamine, 2,4-Dimethylphenol, Dimethyl phthalate, 1,3-Dinitrobenzene, 4,6-Dinitro-2-methylphenol, 2,4-Dinitrophenol, 2,4-Dinitrotoluene, 2,6-Dinitrotoluene, Dinoseb, Di-n-octyl phthalate, Diphenylamine, Disulfoton, Ethyl methanesulfonate, Famphur, Fluoranthene, Fluorene, Hexachlorobenzene, Hexachlorocyclopentadiene, Hexachlorophene, Hexachloropropene, Indeno(1,2,3-cd)pyrene, Isodrin, Isophorone, Isosafrole, Kepone, Methapyrilene, Methoxychlor, 3-Methylcholanthrene, Methyl methanesulfonate, 2-Methylnaphthalene, Methyl parathion, 1,4-Naphthoquinone, 1-Naphthylamine, 2-Naphthylamine, 2-Nitroaniline, 3-Nitroaniline, 4-Nitroaniline, 2-Nitrophenol, 4-Nitrophenol, Nitroquinoline-1-oxide, N-Nitrosodiethylamine, N-Nitrosodimethylamine, N-Nitrosodiphenylamine, N-Nitrosodi-n-propylamine, N-Nitrosomethylethylamine, N-Nitrosomorpholine, N-Nitrosopiperidine, N-Nitrosopyrrolidine, 5-Nitro-o-toluidine, Parathion, Pentachlorobenzene, Pentachloronitrobenzene, Pentachlorophenol, Phenacetin, Phenanthrene, Phenol, 1,4-Phenylenediamine, Phorate, 2-Picoline, Pronamide, Pyrene, Safrole, 1,2,4,5-Tetrachlorobenzene, 2,3,4,6-Tetrachlorophenol, Toxaphene, 2,4,5-Trichlorophenol, 2,4,6-Trichlorophenol, O,O,O-Triethyl phosphorothioate, 1,3,5-Trinitrobenzene. **Bis(2-chloro-1-methylethyl)ether (CAS 108-60-1) and Tetraethyl dithiopyrophosphate (Sulfotepp - CAS 3689-24-5) are listed in Appendix I and should be requested for analysis using using library search procedures.**

(4) Appendix I (35 IAC 724.195) parameters include PCB aroclor analysis (Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260) and pesticide analysis (Aldrin, α-BHC, β-BHC, γ-BHC (Lindane), δ-BHC, Chlordane, Chlorobenzilate, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Diallate, Dieldrin, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin aldehyde, Heptachlor, Heptachlor epoxide).

(5) Appendix I (35 IAC 724.195) parameters include herbicide analyses (2,4-D, Silvex, 2,4,5-T).

(6) Appendix I (35 IAC 724.195) parameters include PCDDs analysis (including tetrachlorodibenzo-p-dioxins (see also 2,3,7,8-TCDD), pentachlorodibenzo-p-dioxins and hexachlorodibenzo-p-dioxins) and PCDFs analysis (including tetrachlorodibenzofurans, pentachlorodibenzofurans, and hexachlorodibenzofurans).

(7) Interim Groundwater Sampling Program includes all 9 target inorganic compounds specified in the ROD: antimony, arsenic, chromium, iron, lead, manganese, mercury, nickel, and boron).

(8) Appendix I (35 IAC 724.195) parameters include Barium, Beryllium, Cadmium, Cobalt, Copper, Selenium, Silver, Thallium, Tin, Vanadium, and Zinc and Cyanide and Sulfide, as well as certain target inorganic analyses listed in the ROD.

TABLE 6-2b
Quality Control Sample Requirements for for Appendix I (35 IAC 724.195) Groundwater Monitoring
MIG/DeWane Landfill Superfund Site
Belvidere, Illinois

Geosyntec consultants

Analytical Parameters	Analytical Methods	Field Quality Control Samples			MS/MSD[3]	Total Number of Field Investigation Samples	Total Number of Samples Including QC Samples
		Field Duplicates	Trip Blanks[1]	Equipment Blank[2]			
		Frequency	Frequency	Frequency	Frequency		
Organics							
VOCs	SW-846 8260B	1 per 10 samples	1 per shipment	1 per individual equipment used	1 per 20 samples	25	33
SVOCs, including Semi Volatile Pesticides	SW-846 8270C	1 per 10 samples	N/A	N/A	1 per 20 samples	25	28
Pesticides & PCBs	SW-846 8081A/8082	1 per 10 samples	N/A	N/A	1 per 20 samples	25	28
Herbicides	SW-846 8321A	1 per 10 samples	N/A	N/A	1 per 20 samples	25	28
Dioxins, Low Resolution							
PCDD and PCDF	SW-846 8280	1 per 10 samples	N/A	N/A	N/A	3	3
Unfiltered Metals							
Antimony, total	SW-846 6010B	1 per 10 samples	N/A	N/A	1 per 20 samples	25	28
Arsenic, total							
Barium, total							
Beryllium, total							
Boron, total							
Cadmium, total							
Chromium, total							
Cobalt, total							
Copper, total							
Iron, total							
Lead, total							
Manganese, total							
Nickel, total							
Selenium, total							
Silver, total							
Thallium, total							
Tin, total							
Vanadium, total							
Zinc, total							
Mercury, total	SW-846 7470A						
Inorganics							
Cyanide, total	SW-846 9010B/9014	1 per 10 samples	N/A	N/A	1 per 20 samples	25	28
Sulfide	SM4500 2C	1 per 10 samples	N/A	N/A	1 per 20 samples	25	28

Notes:
1. One trip blank will be included in each shipment containing VOC samples.
2. Equipment Blanks are not necessary if dedicated equipment (i.e. pumps and tubing) is used.
3. MS/MSD samples are investigative samples on which the additional MS and MSD analyses are performed.

PCDDs = Polychlorinated dibenzo-p-dioxins
PCDFs = Polychlorinated dibenzofurans
VOCs = Volatile Organic Compounds
SVOCs = Semi-Volatile Organic Compounds
PCBs = Polychlorinated biphenyls

TABLE 6-3a
Methods, Container, Preservation, Holding Time and Sample Volume Requirements
for Target COC Groundwater Monitoring
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Analytical Parameters	Analytical Methods	Containers	Preservatives	Holding Times	Minimum Sample Volume Required
Organics					
VOCs [1]	SW-846 8260B	40 mL glass, VOA in triplicate with Teflon-lined Septa	HCl to pH<2, Cool to 4°C	14 days	3 - 40 mL vials
Unfiltered Metals[2]					
Antimony, total	SW-846 6010B	500 mL Polyethylene (all metals in one container)	HNO_3 to pH<2, Cool to 4°C	180 days	100 mL
Arsenic, total					
Boron, total					
Chromium, total					
Iron, total					
Lead, total					
Manganese, total					
Nickel, total					
Mercury, total	SW-846 7470A			28 days	100 mL
Field Water Quality Measurements					
pH	Field Measurement using multi-parameter meter and flow-cell				
Specific Conductance					
Temperature					
Turbidity					
Redox Potential					
Dissolved Oxygen					

Notes:
VOCs = Volatile Organic Compounds

(1) Long-term Groundwater Sampling Program includes all 7 target VOCs specified in the ROD: benzene; 1,1-dicholorethylene; 1,2-dichloropropane; methylene chloride; tetrachloroethylene; trichloroethylene; and vinyl chloride.

(2) Long-term Groundwater Sampling Program includes all 9 target inorganic compounds specified in the ROD: antimony, arsenic, chromium, iron, lead, manganese, mercury, nickel, and boron).

TABLE 6-3b
Quality Control Sample Requirements for Target COC Groundwater Monitoring
MIG/DeWane Landfill Superfund Site
Belvidere, Illinois

Geosyntec consultants

Analytical Parameters	Analytical Methods	Field Quality Control Samples			MS/MSD[3]	Total Number of Field Investigation Samples	Total Number of Samples Including QC Samples
		Field Duplicates	Trip Blanks[1]	Equipment Blank[2]			
		Frequency	Frequency	Frequency	Frequency		
Long-term Groundwater Monitoring							
Organics							
VOCs	SW-846 8260B	1 per 10 samples	1 per shipment	1 per individual equipment used	1 per 20 samples	16	23
Unfiltered Metals							
Antimony, total	SW-846 6010B	1 per 10 samples	N/A	N/A	1 per 20 samples	16	20
Arsenic, total							
Boron, total							
Chromium, total							
Iron, total							
Lead, total							
Manganese, total							
Nickel, total							
Mercury, total	SW-846 7470A						

Notes:
VOCs = Volatile Organic Compounds
1. One trip blank will be included in each shipment containing VOC samples.
2. Equipment Blanks are not necessary if dedicated equipment (i.e. pumps and tubing) is used.
3. MS/MSD samples are investigative samples on which the additional MS and MSD analyses are performed.

Table 6-4. Long-Term Landfill Gas Monitoring Locations
MIG/DeWane Landfill Superfund Site
Boone County, Illinois

Geosyntec consultants

Gas Probe Locations[1]	Relative Location	Gas Collection Monitoring Locations[1]	Relative Location	Dual Phase Extraction Locations[2]	Relative Location	Passive Gas Vent Locations[2]	Relative Location	Passive Gas Vent Locations[2]	Relative Location
GP-10	West Edge of Borrow Pit	RC-1-AP	South Site Boundary	DP-01	Landfill Top Slopes	GV-01	Landfill Side Slopes	GV-27	Landfill Side Slopes
GP-11	West Edge of Borrow Pit	RC-1-AV	South Site Boundary	DP-02	Landfill Top Slopes	GV-02	Landfill Side Slopes	GV-28	Landfill Side Slopes
GP-12	West Edge of Borrow Pit	RC-2-AP	West Site Boundary	DP-03	Landfill Top Slopes	GV-03	Landfill Side Slopes	GV-29	Landfill Side Slopes
GP-13	West Edge of Borrow Pit	RC-2-AV	West Site Boundary	DP-04	Landfill Top Slopes	GV-04	Landfill Side Slopes	GV-30	Landfill Top Slopes
GP-14	West Edge of Borrow Pit	RC-3-AP	West Site Boundary	DP-05	Landfill Top Slopes	GV-05	Landfill Side Slopes	GV-31	Landfill Side Slopes
GP-15	West Edge of Borrow Pit	RC-3-AV	West Site Boundary	DP-06	Landfill Top Slopes	GV-06	Landfill Side Slopes	GV-32	Landfill Side Slopes
GP-20	Wycliffe Estates	RC-4-AP	West Site Boundary	DP-07	Landfill Top Slopes	GV-07	Landfill Side Slopes	GV-33	Landfill Side Slopes
GP-21	Wycliffe Estates	RC-4-AV	West Site Boundary	DP-08	Landfill Top Slopes	GV-08	Landfill Side Slopes	GV-34	Landfill Top Slopes
GP-22	Wycliffe Estates	RC-5-AP	West Site Boundary	DP-09	Landfill Top Slopes	GV-09	Landfill Side Slopes	GV-35	Landfill Side Slopes
GP-23	Wycliffe Estates	RC-5-AV	West Site Boundary	DP-10	Landfill Top Slopes	GV-10	Landfill Top Slopes	GV-36	Landfill Side Slopes
GP-24	Wycliffe Estates	BLOWER-R	Northwest Boundary	DP-11	Landfill Top Slopes	GV-11	Landfill Top Slopes	GV-37	Landfill Side Slopes
GP-25	Wycliffe Estates	BLOWER-L	Northwest Boundary	DP-12	Landfill Top Slopes	GV-12	Landfill Side Slopes	GV-38	Landfill Side Slopes
GP-26	North Site Boundary	KP - NORTH	Northwest Boundary	DP-13	Landfill Top Slopes	GV-13	Landfill Side Slopes	GV-39	Landfill Side Slopes
GP-27	North Site Boundary	KP - SOUTH	Northwest Boundary	DP-14	Landfill Top Slopes	GV-14	Landfill Side Slopes	GV-40	Landfill Side Slopes
GP-28	East Site Boundary			DP-15	Landfill Top Slopes	GV-15	Landfill Side Slopes	GV-41	Landfill Side Slopes
GP-29	South Site Boundary			DP-16	Landfill Side Slopes	GV-16	Landfill Side Slopes		
GP-30	South Site Boundary			DP-17	Landfill Side Slopes	GV-17	Landfill Side Slopes		
GP-31	South Site Boundary					GV-18	Landfill Side Slopes		
GP-32	West Site Boundary					GV-19	Landfill Side Slopes		
GP-33	West Site Boundary					GV-20	Landfill Side Slopes		
GP-34	South Site Boundary					GV-21	Landfill Side Slopes		
GP-35	South Site Boundary					GV-22	Landfill Side Slopes		
GP-36	East Site Boundary					GV-23	Landfill Side Slopes		
GP-37	East Site Boundary					GV-24	Landfill Side Slopes		
MW-13	West Site Boundary					GV-25	Landfill Side Slopes		
MW-14	Borrow Pit Area					GV-26	Landfill Side Slopes		

Notes:

(1) Quarterly will be conducted at listed Gas Probe Locations and Gas Collection Monitoring Locations.

(2) Annual gas monitoring will be conducted at listed Dual Phase Extraction Locations and Passive Gas Vent Locations.

(3) Landfill gas monitoring locations are shown on Figure 6-3.

APPENDIX H

First Environmental Laboratory, Inc.

Quality Assurance Program Plan

First Environmental Laboratories, Inc.

Quality Assurance Manual

Start Date: 11/28/11
End Date:

Quality Assurance Program Plan

for

First Environmental Laboratories, Inc.

1600 Shore Road
Naperville Illinois 60563
Phone 630-778-1200
Fax 630-778-1233

Stan Zaworski – Laboratory Director (Owner) — Date 11/28/11

Reviewed by Lorrie Franklin - Director of Data Quality (Owner) — Date 11/28/11

William H. Mottashed – VP Operation (Owner) — Date 11/28/11

Scott Gerrick – VP Marketing (Owner) — Date 11/28/11

Neal Cleghorn – Technical Director — Date 11/28/11

Effective Date (Beginning) 11/15/11 (End) _____

This QAPP is reviewed annually and if necessary a section(s) will be revised to reflect current practices and certification requirements. This QAPP establishes protocols of operation for the analysis of environmental samples. Drinking water, wastewater, groundwater, soils, sediments, and waste samples are analyzed by this laboratory for iorganic and organic analytes.

Table Of Contents

3. Laboratory Organization

3.1. Introduction

Although this Quality Assurance plan is enforced under the guidance and supervision of the Director of Data Quality, the primary responsibility for data integrity and quality rests with each and every employee involved in the generation of analytical data. In the event that changes occur within the management team or within the analytical team, transition plans and/or training plans are developed to ensure that the quality of the analytical tests and services are not impaired.

3.2. Ensuring the Integrity and Confidentiality of Data

3.2.1. Integrity

3.2.1.1. Our laboratory has managerial and technical personnel with the authority and resources needed to identify the occurrence of departures from the quality system or from the Standard Operating Procedures (SOPs) and to initiate actions to prevent or minimize departures.

3.2.1.2. If internal pressures, such as, turn-around-time, client demands, management demands, or performance demands, or external pressures, such as commercial or financial, are identified as adversely affecting the quality of data, then appropriate action is taken to remedy the situation.

3.2.1.3. Owners, managers and employees of *First Environmental Laboratories, Inc.* must be free and clear of organizational and personal conflict of interest. The laboratory and laboratory personnel actively avoid involvement in activities that could be construed as a conflict of interest, and thereby diminish confidence in its competence, impartiality, judgment or operational integrity.

3.2.1.4. First Environmental Laboratories, Inc. conducts initial and annual training to ensure communication of our Code of Ethics. Details regarding the training program are found in SOP #127, titled "Data Integrity & Ethics".

3.2.2. Confidentiality

3.2.2.1. All information and records pertaining to client samples and analyses conducted on client samples are confidential.

3.2.2.2. Data and information pertaining to data produced for a client will not be released to any other source by telephone, facsimile or other electronic means without the express permission of the client. When feasible, permission will be obtained in writing. If not

feasible, the date verbal permission was obtained and the initials or signature of the person obtaining permission will be noted on the data file.

3.2.2.3. Facsimiles and E-mail documents will contain the following qualifier:
"The pages accompanying this facsimile (E-mail) transmission contain information, which is confidential or privileged. The information is intended to be for the use of the individual or entity named above. If you are not the intended recipient, be aware that any disclosure, copying, distribution or use of the contents of this information is prohibited. If you have received this facsimile in error, please notify us immediately so that we can arrange for the retrieval of the original documents at no cost to you." Alternatively, a stamp will be applied that states "confidential" to the cover page of the facsimile or E-mail.

3.3. Laboratory Organization & Responsibilities:

3.3.1. Laboratory Director:

- Ensures compliance with the current TNI Standard.
- Oversees all analytical and operational activities of the laboratory including but not limited to the following:
  - sample acceptance, receipt, log-in, and storage,
  - production,
  - quality control activities, and
  - supervision of laboratory personnel.
- Designates laboratory supervisors, the quality assurance officer, and the technical director.
- Nominates deputies in case of absence of quality assurance officer or technical director.
- Ensures that the Quality System is documented in a quality manual and communicated to, understood, and implemented by all laboratory personnel concerned.
- Implements and enforces adherence to company policies and procedures.
- Approves all documents prepared to support and guide laboratory operations.

3.3.2. Director of Data Quality:

- Ensures compliance with the current TNI Standard.
- Ensures that all personnel are properly trained in quality assurance policies and procedures, and that all quality assurance objectives are being met.
- Coordinates training of analysts and ensures appropriate documentation of training is maintained.
- Conducts an objective internal audit of quality systems and technical operation annually without outside influence. Prepares Quality Report to Management annually in conjunction with internal audit.

- Coordinates QA/QC procedures and analytical data review procedures.
- Evaluates data objectively and performs assessment without outside managerial influence.
- Notifies laboratory management of deficiencies in the quality system.
- Revises procedures and updates quality manual as required.
- Pursues and maintains appropriate certifications and contracts.
- Approves Standard Operating Procedures (SOPs).
- Coordinates document control of all documents supporting laboratory operations.
- Possesses general knowledge of the analytical methods performed by the laboratory and quality systems.

3.3.3. Technical Director:

- Ensures compliance with the current TNI Standard.
- Oversees function of LIMS and internal computer networks.
- Monitors standards of performance in Quality Control & Quality Assurance.
- Monitors validity of the analyses performed and data generated to assure reliable data.
- Coordinates technical operations of laboratory including development of new capabilities.
- Oversees provision of resources needed to ensure requirements of quality system are met.

3.3.4. Project Manager:

- Interfaces with client to define Data Quality Objectives (DQO) for a given project. This includes accreditation status, analytical methods, detection limit requirements, QA/QC requirements, turn-around time, and deliverables.
- Accepts / coordinates requests from clients for sampling supplies, delivery and pickup.
- Coordinates lab activities to ensure that the client defined DQOs are being met.
- Reviews all data generated by the lab and assembles final report for the client. All questions related to the final report are directed to the Project Manager.
- Forwards reports to client in desired format via e-mail or facsimile.
- Prepares invoices for projects.
- Coordinates requests for QA packages and/or electronic deliverables
- Fields all questions from client relating to the project.

3.3.5. Senior Analyst:

A senior analyst has the following additional responsibilities. All the responsibilities detailed for an Analyst also apply.

- Responsible for scheduling instrument/method validation and maintenance of periodic studies, e.g., MDL studies, per method requirements.
- Trains new analysts, analyst-in-training and technicians in their area of analytical responsibility. The training effort is coordinated with the Director of Quality Assurance and/or the Technical Director.
- Performs SOP review whenever a new analyst is trained to perform the analysis.
- Performs method reviews whenever a revised method is issued by regulatory source.
- Reviews analytical data produced by analyst-in-training or technician.

3.3.6. Analyst:

- Schedules sample analyses to meet all holding times and due dates
- Responsible for the analysis of samples in accordance with approved methods and SOPs, the QAP and/or client defined protocols.
- Reviews analytical data and ensures all Quality Control indicators are within acceptance criteria. Performs and documents corrective action when necessary. Informs Project Manager of any out of control situation. Flags data appropriately using current laboratory guidelines.
- Enters data in LIMS
- Maintains appropriate log books for accuracy and completeness.
- Performs routine periodic maintenance on instrumentation.
- QA Support
  - Ensures the procedures used in the laboratory comply with SOP.
  - Maintains control charts as required by specific method SOPs
  - Prepares data packages as required to meet project requirements.

3.3.7. Analyst-in-training:

An Analyst-in-training analyst has the following responsibilities. All the responsibilities detailed for an Analyst apply.

- Responsible for working closely with the senior analyst to ensure that data quality is not compromised during training.
- Responsible for ensuring that all analytical data is reviewed by an analyst or supervisor authorized to perform data review.

3.3.8. Laboratory Assistants

- Maintains inventory and stock of sampling supplies.
- Fulfills requests for sampling supplies per client's specifications.
- Distributes laboratory supplies received from various vendors.

- Cleans laboratory glassware in accordance with established procedures.
- Provides courier services to clients requesting sample pickup or delivery of sampling supplies.
- Assists with filing.
- Manages sample storage and disposal for routine samples.

3.3.9. Administrative Assistants :

- Receives all samples, inspects and documents condition of shipping and sample containers.
- Verifies chain of custody against samples and/or associated paperwork. Records any discrepancies and notifies Project Manager of same for communication to client.
- Logs samples into the Laboratory Information Management System.
- Places samples in secured refrigerated area for storage.
- Mails completed reports and invoices.
- Files completed reports.
- Responsible for shipping and receiving.

3.3.10. Information Technology Specialists:

- Customizes and maintains the Laboratory Information Management System (LIMS).
- Ensures that appropriate hardware exists to enable effective use of the LIMS at all levels of laboratory operations.
- Implements and maintains any software required for the production of analytical data and reports. This includes programs or routines for electronic data deliverables.
- Implements and maintains the laboratory's internal computer networking hardware and software.
- Implements and maintains the laboratory's external internet presence (web site) and communications (e-mail).
- Maintains documentation in support of the activities listed above.

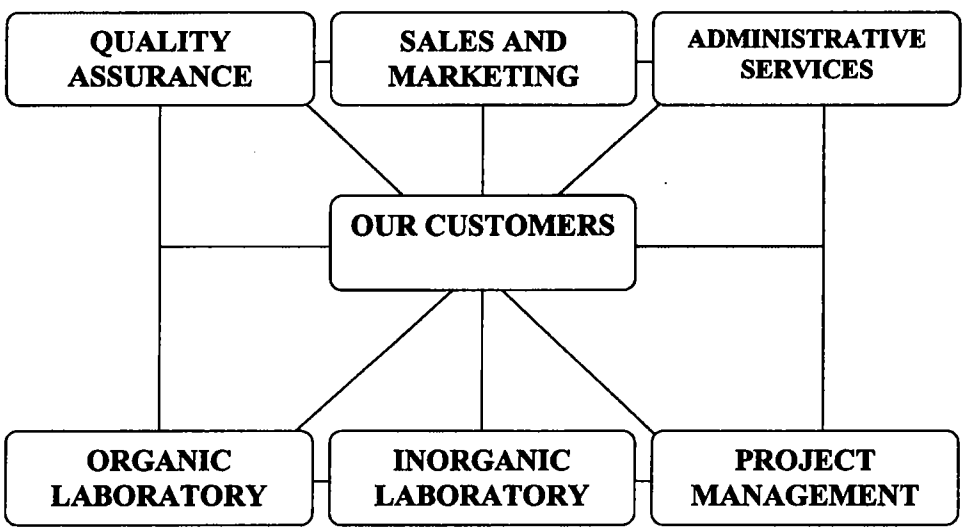
3.3.11. Marketing Director:

- Identifies potential clients and initiates contact.
- Maintains relationship with current clients.
- Coordinates sample bottle deliveries and sample pickup.

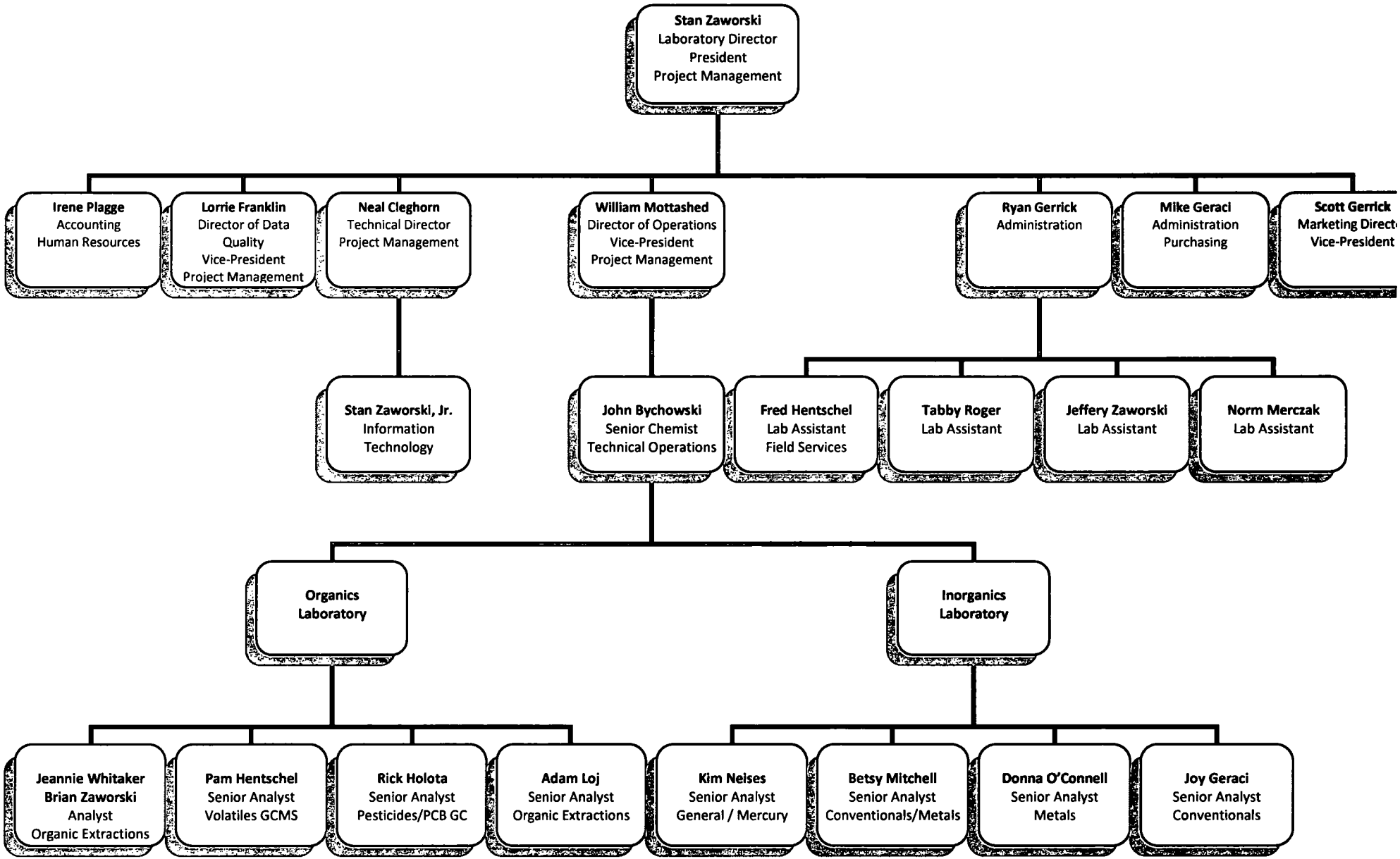
3.4. Managing for Our Customers

First Environmental Laboratories, Inc.

MANAGING FOR OUR CUSTOMERS



First Environmental Laboratories, Inc.


Stan Zaworski
Laboratory Director
President
Project Management
Irene Plagge
Accounting
Human Resources
Lorrie Franklin
Director of Data
Quality
Vice-President
Project Management
Neal Cleghorn
Technical Director
Project Management
William Mottashed
Director of Operations
Vice-President
Project Management
Ryan Gerrick
Administration
Mike Geraci
Administration
Purchasing
Scott Gerrick
Marketing Direct
Vice-President
Stan Zaworski, Jr.
Information
Technology
John Bychowski
Senior Chemist
Technical Operations
Fred Hentschel
Lab Assistant
Field Services
Tabby Roger
Lab Assistant
Jeffery Zaworski
Lab Assistant
Norm Merczak
Lab Assistant
Organics
Laboratory
Inorganics
Laboratory
Jeannie Whitaker
Brian Zaworski
Analyst
Organic Extractions
Pam Hentschel
Senior Analyst
Volatiles GCMS
Rick Holota
Senior Analyst
Pesticides/PCB GC
Adam Loj
Senior Analyst
Organic Extractions
Kim Neises
Senior Analyst
General / Mercury
Betsy Mitchell
Senior Analyst
Conventionals/Metals
Donna O'Connell
Senior Analyst
Metals
Joy Geraci
Senior Analyst
Conventionals

3.5. Key Staff / Area of Responsibility

Key Staff	Area of Responsibility
Stan Zaworski	Laboratory Director / Project Manager
Lorrie Franklin	Director of Data Quality
Neal Cleghorn	Technical Director / Project Manager
Bill Mottashed	Project Manager
John Bychowski	Senior Analyst – Organics / volatiles
Pam Kyncl-Hentschel	Analyst – Organics / volatiles
Adam Loj	Senior Analyst – Organics / semi- volatiles
Rick Holota	Senior Analyst – Organics / pesticides & PCBs
Kim Nieses	Senior Analyst – Inorganics / general/mercury
Donna O'Connell	Senior Analyst – Inorganics / metals
Betsy Ann Mitchell	Senior Analyst - Inorganics / conventionals & metals
Joy Geraci	Senior Analyst – Inorganics / conventionals
Jeannie Whittaker	Analyst – Organics / organic extraction
Brian Zaworski	Analyst – Organics / organic extraction
Fred Hentschel	Laboratory Assistant/Field
Norm Merczak	Laboratory Assistant
Katie Pilmer	Laboratory Assistant
Jeff Zaworski	Laboratory Assistant
Mike Geraci	Administrative Assistant
Irene Plagge	Administrative Assistant
Ryan Gerrick	Administrative Assistant
Stan Zaworski, Jr.	Information Technology Specialist
Scott Gerrick	Marketing Director

4. Quality Systems Program Description

4.1. Introduction

Quality Systems include all Quality Assurance (QA) policies and Quality Control (QC) procedures developed and followed by our laboratory to ensure and document the quality of the analytical data. Data integrity and ethics is inherent to the success of our business and adherence to the established procedures is vital.

4.2. Quality Systems

4.2.1. Many QA/QC policies and procedures are documented in this manual. These policies and procedures were developed to meet Quality Systems of 2009 TNI Standard: Volume 1: Management and Technical Requirements for Laboratories Performing Environmental Analysis. This standard is required to be implemented by July 1, 2011. This standard has incorporated the current version of ISO/IEC 17025. If the test method or regulatory program specifies more stringent standards or requirements, they will be met. If it is not clear which requirements are more stringent, the method or regulatory program requirements will be met. This manual is organized as a living document and will be revised periodically to meet the current standard.

4.2.2. *First Environmental Laboratories, Inc.* is an independent environmental laboratory dedicated to providing industry, government, and consultants with timely and accurate chemical analyses. A wide variety of sample matrices can be analyzed in support of various federal, state, and local regulations, while providing a level of customer service unequaled in our industry.

4.2.3. *First Environmental Laboratories, Inc.* is accredited by Illinois EPA Environmental Laboratory Accreditation Program (IL ELAP) in accordance with the TNI standards. Our objective is to establish and implement a compliant Quality Systems Program that ensures all personnel involved in the generation of analytical data are trained to produce data of known and consistently high quality. Adherence to this program will ensure our data is accurate and complete, and consistently meets criteria as defined by our clients and/or the regulatory agencies.

4.2.4. The responsibility for the successful implementation of this program lies with each employee, and all levels of management strictly enforce its implementation.

4.2.5. The program utilizes the following internal documents:

- Quality Assurance Manual (QAM)
- Standard Operating Procedures (SOPs)
- Chemical Hygiene and Safety Plan (CHSP)

These documents detail the policies and procedures developed by *First Environmental Laboratories, Inc.* to ensure the production of high quality, legally defensible data. All laboratory personnel are required to understand and implement the policies and procedures described in these documents. The laboratory director must approve departures from documented policies and procedures.

4.2.6. Periodic review of our QAM, SOPs, and supporting documents ensures continuous improvement of the laboratory and continued compliance with the effective TNI Standard.

4.3. Data Integrity Systems

4.3.1. The laboratory has developed a Code of Ethics and a Data Integrity and Ethics training program. The data integrity system includes:

- Initial and refresher data integrity training,
- signed data integrity documentation for all lab employees,
- periodic monitoring of data integrity, and
- data integrity procedures documentation.

4.3.2. A mechanism exists for confidential reporting of data integrity issues in the laboratory. Management is committed to fostering a receptive environment in which all employees may privately discuss ethical issues or report items of ethical concern.

4.3.3. The procedures and documentation, and overall effectiveness of the program are reviewed and if needed, updated, by management annually.

4.3.4. Data integrity records are available for inspection by client or primary accrediting body assessor.

5. Document Control

5.1. Introduction

Document control procedures are established to ensure that a historical record of all SOPs, manuals, or documents is maintained. The record needs to clearly indicate the time period during which the procedure or document was in force. Proper maintenance of the historical records and the record keeping procedures used by the laboratory ensures the ability to legally defend the data.

5.2. Document Approval and Issue

5.2.1. All documents issued to personnel in the laboratory as part of the quality system are reviewed and approved for use by authorized personnel prior to issue.

5.2.2. SOPs and other documents, such as the QAM and CHSP, are available to all personnel in support of their assigned analytical responsibilities. Distribution logs are retained that provide a record of document distribution. The Director of Data Quality coordinates the distribution and collection of controlled documents. Document control ensures that pertinent issue of appropriate documents is available at the point of use. Documents are periodically reviewed and revised to ensure continuing compliance with the regulatory and accreditation sources. Document control ensures that obsolete documents are removed from all points of use. An electronic copy of obsolete revisions of a document is maintained as a part of the permanent historical record.

5.2.3. Controlled documents are uniquely identified including revision number, date of issue, page number and total number of pages, implementation / end use date, and signature of person(s) responsible for document approval.

5.3. Document Changes

5.3.1. Changes to documents shall be reviewed and approved by the same function originally responsible for document preparation and approval. Designated representatives will have access to the historical record in order to assess the change prior to approval.

5.3.2. Changes to documents may be made by hand pending the re-issue of the document. The change will be clearly marked, initialed and dated by the Director of Data Quality or designated representative. Re-issuance of a revised document will occur within a reasonable time frame.

5.4. SOPs.

5.4.1.
Each SOP contains the following information within the header:

Filename: \\madre\company\word files\sop\conv\ammonia.doc
Revision No.: 2 Date of Last Revision: 6/13/96
Page 2 of 3

Each SOP contains the following information on the last page:

Approvals

Reviewed for Technical Accuracy by: _____

Reviewed for Quality Assurance Compliance by: _____

Implementation Date: _____

End Use Date: _____

5.4.2. SOPs are maintained to accurately reflect all phases of current laboratory activities.

5.4.3. SOPs are reviewed for accuracy prior to initiating training of a new analyst, or if the method source is updated. At a minimum, SOPs are reviewed every five years. If the review is performed and the SOP does not require revision, the SOP will still be re-issued with a new revision number thereby initiating the next five year cycle. A continuous log is kept that summarizes the dates of revision, associated revision number, and why the revision was performed.

5.5. Quality Assurance Program Plan

5.5.1. The Quality Assurance Program Plan (QAPP) is reviewed for compliance with part 186, Accreditation of Laboratories for Drinking Water, Wastewater and Hazardous Waste Analyses, bi-annually. The title page lists the effective date (beginning & end).

5.5.2. The QAPP is reviewed bi-annually for accuracy and compliance with TNI quality systems.

5.6. Obsolete DocumentS and Maintenance of the Historical Record

5.6.1. Obsolete versions of the document are removed from distribution. Removal from use is documented on the distribution form.

5.6.2. The laboratory maintains an archive of all obsolete or replaced procedures, documents, or records, for a minimum of seven years.

5.7. Electronic Copies of Documents

All documents are prepared and maintained electronically. Revisions to SOPs and the QAM are made by copying the document to a new file prior to beginning the revision. Obsolete documents are moved to subdirectories labeled "obsolete".

6. Project Review & Management

6.1. Introduction

Thorough project review prior to sample receipt is inherent to the success of the laboratory. Procedures for subcontracting samples, and purchasing supplies and services are developed to ensure that client requirements are met. In the event that work does not conform with client requirements and/or internal procedures, action will be taken to investigate and resolve the issue in a timely manner. Procedures for resolving client concerns and complaints are established to ensure client satisfaction.

6.2. Review of Requests and Contracts

6.2.1. Contracts may be any written or oral agreement to provide a client with environmental testing services.

6.2.2. Project Managers have the responsibility of working with the client to define Data Quality Objectives (DQO) including: appropriate analytical methods to meet client needs, detection limit requirements, QA/QC requirements, deliverables, accreditation status, turn-around time and subcontracted analyses. The Project Manager informs the client of any potential conflict, lack of accreditation status, subcontracted analytes, or inability to complete the work in accordance with the request. Issues are resolved before samples are received.

6.2.3. Routine requests for analytical services are documented using an internal workorder. An example of the form is included at the end of this section.

6.2.4. Contracts requiring acceptance signatures are reviewed by the Project Manager and if necessary, the Director of Data Quality and accounting representative prior to signing. The contract will be acceptable both to the laboratory and the client. The reverse side of the workorder provides documentation regarding Project / Contract Review and New Client Checklist. An example of the form is included at the end of this section.

6.2.5. Appropriate notations are made to the bid/contract or internal workorder documenting decisions. The client is informed of deviations from the contract.

6.2.6. In the event that a contract changes after work commences, changes will be documented and communicated to affected personnel.

6.2.7. Suspension of accreditation, revocation of accreditation, or voluntary withdrawal of accreditation must be reported to the client.

6.2.8. Non-routine requests for analyses of unusual matrices, non-routine analytes, non-routine reporting limits are carefully assessed prior to accepting samples for analysis. Appropriate data qualifiers are used to flag data and the data flags are defined in the case narrative. Non-routine requests for analytical services are documented using an internal assessment form. An example of the form is included at the end of this section.

6.3. Subcontracting of Analyses

6.3.1. The following analytes are routinely subcontracted.

% Sulfur	EOX
%Chlorine	Ethylene Glycol
Alcohols	Herbicides
Asbestos Bulk (PLM)	MBAS
Asbestos Water (TEM)	Microbiological Testing
BTU	Radiologicals
Dioxin & Furans	TOX

6.3.2. The above list appears in *First Environmental's* Service Brochure. Subcontracted analytes are identified when verbal or written quotations are provided.

6.3.3. Samples are subcontracted to a certified laboratory. Subcontracted laboratories are expected to adhere to the requirements of their respective accreditations/certifications and the method. Additionally, subcontracted laboratories are expected to meet project specific requirements as established and communicated by *First Environmental Laboratories, Inc.*

6.3.4. The laboratory is responsible to the client for the subcontractor's work, except in the case where the client or a regulatory authority specifies which subcontractor is to be used.

6.3.5. A master list of laboratories that receive subcontracted analyses is maintained. Copies of applicable accreditations/certifications are on file for reference.

6.3.6. The final Analytical Report identifies subcontracted analytes by flagging the analyte with an "S" If the analysis is not accredited, an "N" flag will also appear on the report. The data flags are defined in the case narrative included in the final Analytical Report.

6.4. Purchasing Supplies and Services

6.4.1. The laboratory uses various support services such as instrument manufacturer's technical services, general scientific supply houses, specialty chemical supply houses, specialty gas suppliers, deionized water suppliers, and other laboratories.

6.4.2. The laboratory uses only those outside support services and supplies that are of adequate quality to sustain confidence in the laboratory's ability to continue to produce quality data and provide the highest level of service to our clients.

6.4.3. A vendor master list is maintained and utilized.

6.4.4. Similarly, an item master list for routinely purchased supplies is maintained and utilized. Items on the master list, such as, standards, reagents, sample bottles, and other consumables known to possibly affect the quality of the data have been carefully chosen to meet the specification defined in the methods. The historical successful performance of the method confirms the adequacy of the purchased supplies. The use of the master list ensures continuity of consumable supplies. Changes are initiated with the approval of either the Laboratory Director, Director of Quality or the Technical Director. Any change relating to a critical consumable, e.g., standards, reagents or sample bottles is carefully monitored to ensure that the quality systems are not compromised.

6.4.5. Laboratory personnel are also responsible for monitoring and maintaining an adequate inventory of consumables, reagents and standards necessary to perform requested tests.

6.4.6. Consumables, reagents and standards received by the laboratory are distributed to appropriate laboratory personnel. Laboratory personnel are responsible for inspecting, properly labeling, and storing all consumables, reagents and standards.

6.4.7. Sample bottles are monitored for cleanliness on a semi-annual basis. Container blanks are analyzed for Volatile, Semi-volatile, Pesticide/PCBs, metals, and cyanide. The analysis is performed at the time WP performance samples are analyzed. The data is filed with the WP results.

6.4.8. If an item is rejected, the purchasing coordinator is notified. Depending on the scope of the problem, the purchasing coordinator will contact the appropriate manager or director, such as the Technical Director, Director of Quality Assurance, or Laboratory Director, to obtain assistance in resolving the issue. Documentation regarding actions taken and resolution of the problem will be maintained.

6.5. Client Concerns / Complaints and Feedback

6.5.1. Issues raised by auditors, employees, or clients will be discussed and resolved at the weekly meeting held with all staff.

6.5.2. If an issue requires investigation, the Laboratory Director will assign the task to a Senior Analyst, Project Manager, the Director of Data Quality or the Technical Director. The level of documentation associated with this investigation will be appropriate to the seriousness of the issue. All appropriate steps will be taken to resolve the issue to the satisfaction of all concerned.

6.5.3. The Laboratory Director, Project Manager assigned to client, and Director of Data Quality will determine when a complaint justifies written documentation. The form titled, Resolution of Complaint / Concern will be used to document the complaint / concern and the steps taken to resolve the issue. An example of the form is included at the end of this section.

6.5.4. All documentation relating to the issue, the actions taken, and final resolution will be retained as part of the record. The Laboratory Director will review all documentation and approve the final actions taken to resolve the issue. The need for follow-up will be evaluated and if necessary assigned.

6.5.5. If a complaint raises doubt concerning the laboratory's compliance with documented policies and procedures, or with the requirements of accreditation the laboratory will audit the area(s) in question.

6.5.6. Clients always have the right to inspect the work performed, including the supporting quality assurance data and documentation of quality assurance activities. They also have the right to inspect corrective action documentation relating to the resolution of a complaint or concern.

6.5.7. Annually, clients are surveyed for positive and negative feedback regarding the quality of analytical testing and services provided by *First Environmental Laboratories, Inc.* The results of the survey are assessed by management and used to continually improve our services and quality.

6.6. Control of Nonconforming Environmental Testing

6.6.1. Non-conforming work is work that does not meet acceptance criteria or requirements. Non-conformances can include unacceptable quality control results or departures from standard operating procedures or test methods.

6.6.2. Nonconformance of work with established procedures or agreed requirements of the client will be investigated immediately upon identification.

6.6.3. The laboratory director will assign the task to a Senior Analyst, Project Manager, or Director of Data Quality, or Technical Director. The level of action resulting from this investigation will be appropriate to the significance of the issue. If necessary, work will be halted until the issue is resolved. Test reports may be withheld until the issue is resolved. Previously released data will be assessed for impact and, where necessary, the client will be notified and work recalled. All appropriate steps will be taken to resolve the issue to the satisfaction of all concerned. If work is halted, the Laboratory Director is responsible for authorizing the resumption of work.

6.6.4. Where the evaluation indicates that the nonconforming work could recur or that there is doubt about the compliance of the laboratory's operations with its own policies and procedures the laboratory will audit the area(s) in question.

6.7. Accreditation Status

If accreditation status changes for either the primary laboratory (First Environmental Laboratories, Inc.) or the subcontract laboratory during the course of a project and the change affects the contract, the laboratory is responsible for notifying the client of any suspensions, revocations, or voluntary withdrawal of accreditation.

6.8. References

SOP #122 titled, "Subcontracting"

First Environmental Laboratories, Inc.

WORK ORDER

(rev. 06/07)

CLIENT_____ (NEW / CURRENT)

RUSH 24 hr 48 hr 3 day Routine

In_____Due_____

FEL PROJECT MANAGER _____

CONTACT_____PHONE_____FAX_____

PROJECT NAME_____E-MAIL:_____

NO. OF SAMPLES:_____ MATRIX _____PROGRAM: UST RCRA NPDES SDWA OTHER_____

Conventionals

18	Acidity	24	NO2/NO3
18	Alkalinity	48	TKN
18	Alk, Carb.	30	N, Ammonia
18	Alk, Bicarb	42	O & G
24	Ash	60	O&G soil
30	BOD	60	Polar/NonO&G
50	Bromide	24	PO4, ortho
24	BS&W	30	P, Tot.
75	CEC	18	Paint filter
30	COD	12	pH
18	Chloride	36	Phenols
36	Sol Chloride	72	React CN/S
24	Chlorine	18	TDS
40	Coli., Tot.	18	TS
40	Coli., Fecal	18	TSS
18	Color	24	Silica
12	Conductivity	18	Solids, Settable
18	Corrosivity	24	Solids, Volatile
72	CN, Amenable	24	Sulfate
36	CN, Reactive	42	Soluble Sulfate
36	CN, Total	36	Sulfide React.
18	Density	24	Sulfide
36	Flash Point	36	TOC
24	Fluoride	120	TOX
36	FOC	18	Turbidity
18	Hdns (calc)	18	Distillation
18	Hdns (titr)	18	Soluble Prep
72	MBAS		

Metals

18	Aluminum	36	Mercury
18	Boron	18	Nickel
18	Antimony	18	Potassium
18	Arsenic	18	Selenium
18	Barium	18	Silver
18	Beryllium	18	Sodium
18	Cadmium	18	Thallium
18	Calcium	18	Vanadium
18	Chromium	18	Zinc
24	Chrom., Hex.	18	Metals Prep
18	Cobalt	306	HSL (CLP)
18	Copper	186	PP Metals
18	Iron	126	SDWA Metals
18	Lead	24	SDWA Pb
18	Magnesium	126	RCRA Metals
18	Manganese	100	TCLP Lead

5+ Metals $12 and Hg $30
</=4 Metals $18 and Hg $36

30	Asbestos	100	Gross Alpha
150	BTU	100	Gross Beta
150	EOX	170	Total Radium
150	TPH (IR)	225	Radium 226
120	Karl Fischer	225	Radium 228
48	Chrome +6 - soil	350	226/228
		120	Tritium
		250	Strontium 90

GC/MS

180	VOA
60	BTEX
90	BTEX+MTBE
90	1-5 VOC cmpds
300	BNA
150	PNA
150	BN Only
150	Acid Only
12	5035 Kits

GC

180	Pest/PCB
120	Pests
120	PCBs
90	PCBs Oil
90	PCB Wipe
280	Herbs
150	Alcohols
100	TPH (GC)

RCRA Analyses

12	Corrosivity
36	Ignitability
72	Reactivity
180	TCLP VOA
300	TCLP BNA
120	TCLP Pests
280	TCLP Herbs
126	TCLP Metals (Includes digestion)
100	TCLP Prep
150	ZHE Prep
1256	Full TCLP (all of the above)
856	Full TCLP (No Pest/Herbs)
630	F-list 262 LN Panel
1162	R-code (No Pest/Herbs)

PRICING

Unit Price _____
Surcharge _____
Discount _____
Net _____
# of Samples _____
Job Charges _____

TOTAL _____

n:\qa\qapp\qapp 2011 revision\workorder form 0607.doc Revised 06/01/07

Route: SSZ, SCG, WHM, NEC, LF, IRP (IRP to retain file)

New Client Account Checklist

Aspen submitter library account created
(attach submitter proofer report; verify all fields,(i.e. discount, PM, report details), are accurate)

Peachtree account created
(account name is same as Aspen client ID)

Sentry file ID created

Credit check complete and terms extended
(attach supporting documentation)

Follow-up / welcome letter sent
(attach copy)

Work order complete
(attach copy)

Project / Contract Review

Project Managers have the responsibility of working with the client to define Data Quality Objectivie (DQO) including: appropriate analytical method to meet client needs, reporting requirements and deliverables, accreditation status QA/QC requirements, TAT, and notification of subcontracted analyses.

The Project Manager resolves all issues regarding the project requirements prior to sample receipt.

Project Manage Review
Signature / Date:_____

The Director of Data Quality will address unique QA/QC requirements.

Director of Data Quality Review
Signature / Date:_____

The Accounting Representative will address insurance and payment concerns.

Accounting Representative Review
Signature / Date:_____

Notes:_____

New Work – Assessment / Contract Review

New Work – Assessment: non-routine request for analysis of unusual matrices, non-routine analytes, non-routine reporting limits are carefully assessed prior to accepting samples for analysis.

If a new test group needs to be added to the LIMs, then a thorough assessment is required.

Matrix:_____

Analyte(s):_____

Method & Reference:_____

Reporting Limit:_____

Is an MDL available for the analyte(s)? yes no
If no, what will define the lower reporting limit and how will the data be flagged?

_____

Is a calibration curve available for the analyte? yes no
If no, what will define the upper level of the analysis and how will the data be flagged?

_____

Is the analyte NELAC certified? yes no
If no, how will the data be flagged?

Does analyte need to be added to our scope of accreditation? yes no

Does an SOP or bench reference need to be prepared? yes no

Describe the scope of work (no. of samples, duration…)

_____

_____

Signature Director of Data Quality_____Date_____

Signature Laboratory Director _____Date_____

Additional Notes:

Does the test or test group need to be created in LIMS? yes no

Test ID_____

Sort No. _____

Units_____

RDL_____

Format_____

Sig Figs_____

Break Value_____

Weight_____

Volume_____

Dilution_____

Solids %_____

Low Limit_____

High Limit (blank)

CAS #_____

Numeric Result (0)

Alpha Result (usually blank)

Reported Result (blank)

Test Name (as it appears on report)_____

Storet_____

File ID_____

IES ORIG_____

PF_Code T = Total, D = Dissolved, C = TCLP

Remarks_____

Replicate_____

RDL2 (RDL as it appears on report)_____

NELAC? (if not NELAC accredited, insert "N" if subcontract,, insert "S")

HAZ Limit_____

lblT Misc 10 (blank)

Instrument Test Name_____

FIRST ENVIRONMENTAL LABORATORIES, Inc.

RESOLUTION OF COMPLAINT / CONCERN

Initiation Date of Investigation:_____

Client & Contact:_____

Project Manager (First Environmental):_____

Applicable Project ID / Sample No.:_____

Provide details regarding the issue below:

_____

_____

_____

_____

_____

_____

Provide a description of the investigation, including the identity of those involved in the investigation, below:

_____

_____

_____

_____

_____

First Environmental Laboratories, Inc.

u:\forms\qa\client complaint concern.doc
Date: 06/15/11 Revision 2

Describe the final actions taken below:

_____

_____

_____

_____

_____

_____

_____

Date Accepted:_____

Signature Laboratory Director:_____

Signature Project Manager:_____

Signature (Director of Quality Assurance):_____

Note: A copy of this form should be retained in the appropriate project file and in the QA file as part of the historical record.

First Environmental Laboratories, Inc.

u:\forms\qa\client complaint concern.doc
Date: 06/15/11 Revision 2

7. Corrective Action

7.1. Introduction

An integral part of our Quality Assurance Program includes a mechanism for identifying and correcting quality problems when they occur and documenting the action taken, thereby eliminating a re-occurrence of the problem in the future.

7.2. Corrective Action Investigation

7.2.1. When a problem cannot be solved by immediate corrective action, a more detailed process is necessary. The need for a more detailed corrective action investigation may be identified from repeated QCI failures, control charts, system audits, or performance audits. Critical to its success and effectiveness is the involvement of the analyst, supervisor (if applicable) and/or Project Manager, and Director of Data Quality. The following lists the steps involved in this detailed process.

- Identifying a problem.
- Assigning a person responsible for the investigation.
- Uncovering the most likelycause(es) of the problem.
- Correcting the problem.
- Monitoring the effectiveness of the corrective action.
- Documenting the corrective action taken. A copy of the form used to document corrective action is included at the end of this section. The form needs to be signed by the Director of Quality Assurance and if applicable, the supervisor.

7.2.2. Any analyst or member of management recognizing that an issue warrants investigation may initiate corrective action. The Director of Data Quality will coordinate corrective action investigation. Appropriate personnel will be involved in the investigation as determined by the Director of Data Quality.

7.3. Follow-up to Corrective Action Investigation

7.3.1. If an audits finding or the findings of a corrective action investigation cast doubt on the correctness or validity of data reported, the Project Manager(s) will be notified and they will contact the client(s) affected. If necessary, corrected Analytical Reports will be submitted.

7.3.2. The Director of Data Quality is responsible for ensuring that corrective action has actually been performed.

7.3.3. The Director of Data Quality will monitor audits and their findings for the presence of reoccurring problems or patterns.

7.3.4. If it is suspected that the laboratory is not in compliance with it's own policies and procedures or with the TNI standard, the Director of Data Quality will schedule an internal audit of the appropriate areas.

7.4. Technical Corrective Action (Quality Control Indicators)

7.4.1. Throughout this manual, specific indicators are described that help the analysts assess whether a situation is in control. When any of these quality control indicators are outside the acceptable limits, immediate corrective action is required prior to proceeding with the analysis. The corrective action associated with a failed quality control indicator may be a simple process, such as re-preparing a reagent or standard that has deteriorated and documenting such in the lab book or it may be much more complex. If necessary, samples are reanalyzed. Appropriate documentation of actions taken at the bench during analysis are made in the analytical log book.

7.4.2. The individual method SOPs each have a QC table that details the frequency of analysis, acceptance criteria, initial corrective action for QCI failure, and data flagging instructions associated with each QCI. The SOP titled, "Summary of Quality Control Indicators – Inorganics & Organics" (#129) also provide details guiding the appropriate steps to follow in the event a QCI has failed. Corrective action may be multi-tiered proceeding from the simplest procedure to more complex procedures.

7.4.3. The analyst is responsible for assessing QCIs and compliance with method requirements.

7.4.4. The analyst is responsible for initiating corrective action when a QCI does not meet method specified acceptance criteria.

7.4.5. If the corrective action procedures recommended within the method and supporting Inorganic and Organic QC SOPs do not resolve the problem, then the analyst will seek the guidance of the area supervisor and/or Director of Data Quality. A more formal corrective action investigation may need to occur in order to resolve the problem.

7.4.6. If any QCI does not meet acceptance criteria, the data will be flagged in the data base and/or a case narrative will be placed in the project file for the affected samples. The Project Manager is responsible for providing appropriate qualifying information in the case narrative included in the final Analytical Report.

7.4.7. If a problem is observed to be recurring, the Analyst and/or Project Manager(s) are responsible for informing the Director of Data Quality. The Director of Data Quality will initiate a corrective action investigation.

7.5. Preventive Action / Continuous Improvement

TNI defines preventive action as "pro-active process to identify opportunities for improvement rather than a reaction to the identification of problems or complaints." Following the submission of the annual internal audit and QRM, the management team will review and discuss the adequacy of the quality system, technical operations, and laboratory manuals, (e.g. Quality Assurance Manual, Chemical Hygiene Plan, and Statement of Qualifications), to ensure their continuing suitability and effectiveness. If preventive or corrective action is required, action plans will be developed, implemented and monitored. The purpose of an action plan is to track the activity and ensure that followup is performed to verify closure. The plan needs to:

- identify the preventive / corrective action or project,
- summarize the goal,
- summarize the action to be taken,
- identify the responsible person(s),
- establish a target deadline,
- establish followup, and finalization or closure of the activity.

All of the activities detailed above lead to a system of continuous improvement that is an inherent part of the quality systems used within the laboratory.

7.6. Departures from Documented Policies and Procedures

7.6.1. The Laboratory Director must approve departures from documented policies and procedures.

7.6.2. The departure must be documented in the project file. The Project Manager will cite the departure from documented policies and procedures in the case narrative accompanying the final Analytical Report when appropriate.

7.6.3. Any analyst or member of management recognizing that a departure from the quality systems or from standard operating procedures has occurred may initiate corrective action.

7.7. References

SOP #121 titled, "Audit"
SOP #129 titled, "Summary of Quality Control Indicators – Inorganic & Organics"

FIRST ENVIRONMENTAL LABORATORIES, Inc.

CORRECTIVE ACTION

Initiation Date of Corrective Action Investigation:_____

Failed Analyte Under Investigation / Method :_____

Sample Number / PT Program:_____

Date Analysis was Conducted / Reference:_____

Were all QCI's within Control? yes no

If not, provide details regarding the out-of-control measurement below:

_____

_____

Provide a description of the investigation and corrective action taken below or attaché a summary:

_____

_____

_____

_____

_____

_____

_____

_____

Does an additional QC sample need to be analyzed following corrective action to verify whether or not the apparent problem has been solved. ☐ yes ☐ no

Do remedial PT samples need to be ordered? ☐ yes ☐ no

First Environmental Laboratories, Inc.

If yes, indicate whether 1 or 2 remedial PT samples are required to ensure that the last 2 out of three PT samples are acceptable.

Source of PE sample: _____

True Value: _____

Observed Value: _____

Acceptance Criterion Applied: _____

Date Accepted:_____

Signature (Director of Quality Assurance):_____
Lorrie Franklin

FIRST ENVIRONMENTAL LABORATORIES, Inc.

CORRECTIVE ACTION

Date:_____

Performed by:_____

File ID:_____

Failed Analyte(s) Under Investigation:_____

This form documents discrepancies or departures from documented policies and procedures, and corrective action taken during the course of sample analysis and reporting, and follow-up to questions from clients regarding data. *(Copy Project File and, if Project Manager deems appropriate, copy Director of Quality Assurance. Director of Quality Assurance will copy CAR file and enter in on- going QMR file).*

Summary of issue and associated CAR:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Signature (Director of Data Quality or Project Manager)

Note: signature denotes acceptance of CAR / exceptional permission of departure from documented policies and procedures. (Reverse side available for additional notes)

First Environmental Laboratories, Inc.

First Environmental Laboratories, Inc.

PROJECT SUMMARY / PREVENTIVE AND/OR CORRECTIVE ACTION SUMMARY

Title:

Date: 03/15/11

To (route): SSZ, WHM, SCG, NEC, Lab for information purposes ☐

From: Lorrie Franklin

RE: Preventive Action ☐
Corrective Action ☐
Project Summary ☐

Topic or Finding:

Goal:

Action:

Assigned To:

Target Deadline:

*Date Finalized:*_____ */ Signature:*_____

Followup required? ☐ *yes* ☐ *no* *Date for Follow up:* _____

Date of Followup: _____

Signature QA Officer: _____

Is additional action required? If yes, summarize below. If no, add this documentation to current QRM file.

Closure Date: _____

U:\QA\audit & QMR\action mas.doc

8. Instrument & Equipment Maintenance

8.1. Introduction

Proper maintenance of instruments and equipment and it's software used to perform analytical procedures is critical to *First Environmental Laboratories'* ability to produce data of the highest quality. Improperly maintained equipment can lead to costly repairs and increased instrument down time. All equipment is properly cleaned, maintained and operated by authorized and trained analysts. The exact requirements are dependent upon the instrument or piece of equipment, and may range from simple cleaning procedures to more complex routines.

8.2. Establishing Maintenance Requirements

8.2.1. The instrument and equipment manuals are reviewed for specific information regarding the manufacturer's recommended maintenance procedures.

8.2.2. The frequency for performing preventive maintenance is determined. The requirements may be yearly, monthly, weekly, or daily. Forms are prepared to document routine and non-routine maintenance procedures.

8.2.3. Equipment requiring calibration is labeled to indicate date of calibration and a system is in place to trigger recalibration prior to the expiration date.

8.2.4. The location of manufacturer's instructions is referenced if kept separate from the forms used to document these requirements.

8.3. Documentation and Record Keeping

8.3.1. Bound maintenance logbooks are established for instruments and pieces of equipment and its software whose improper functioning could impair *First Environmental Laboratories'* ability to produce data of the highest quality.
Rule of Thumb: If the instrument or piece of equipment requires periodic calibration, then a bound maintenance logbook will be established.

8.3.2. The logbooks are assigned a tracking number and the binder is labeled with the name / number of the logbook, the beginning date of use, and the ending date of use.

8.3.3. The record keeping form(s) must include the following:

- unique identity of equipement and it's software used for testing if significant to the results,
- name of the instrument or item of equipment,
- manufacturer's name, model no. and serial number or other unique identification,

- date received,
- date placed in service,
- date taken out of service,
- current location (where appropriate),
- condition received, e.g., new, used, reconditioned,
- maintenance requirements,
- documentation of routine maintenance performed,
- documentation of non-routine maintenance performed,
- dates and results of calibrations and/or verifications, certificates, and date of the next calibration, and/or verification, where applicable, and
- a copy of manufacturer's instructions or reference to their location

8.3.4. A separate file may be retained that includes:
- operating instructions,
- warranties,
- paperwork related to service provided by a third party,
- maintenance contracts / service agreements.

8.3.5. Also included is information pertaining to a maintenance contract (if applicable) including:
- company carrying the contract
- contract no. / purchase order no.
- cost of contract
- start and end date of contract
- service personnel
- telephone number for contacting service personnel
- copy of the service agreement

8.3.6. The documentation for a malfunctioning instrument or piece of equipment should clearly state the following:
- the problem
- the corrective action taken
- whether or not the problem was resolved
- down time resulting from the problem
- the cost associated with resolving the problem
- analyst's initials
- date

8.3.7. The following forms are included in this section as examples:
- Maintenance Record - Routine (Monthly and Weekly Requirements)
- Maintenance Record - Routine (Daily)
- Maintenance Record - Non-Routine

8.4. Identification of Malfunctioning Instruments / Equipment

8.4.1. If any instrument or piece of equipment is shown to be defective, the unit will be taken out of service. It will be clearly identified and if possible stored at a specified place until it has been repaired and shown by calibration, verification or test to perform satisfactorily.

8.4.2. The Quality Assurance officer will determine the effect the malfunctioning unit may have had on data previously released. If it is determined that reported data was affected, the Project Manager(s) will be notified and they will contact the client(s) affected. If necessary, corrected Analytical Reports will be submitted.

8.4.3. Calibration and function of equipment that goes outside direct control of laboratory is verified prior to returning equipment to service.

8.5. "Loaner" or Temporary Instrument / Equipment

8.5.1. In the event the laboratory uses instrumentation or equipment outside its permanent control, a "loaner" or temporary replacement, the laboratory will ensure that the relevant requirement of the TNI standard and of the analytical procedure are met.

8.6. References

SOP #108 titled, " Instrument / Equipment Maintenance & Record Keeping".

First Environmental Laboratories, Inc.

Maintenance Record - Routine (Year____)

Instrument ID / Model No.:_____

Serial No.:_____ **Date of Purchase**_____

Date Placed in Service_____ **Date Taken Out of Service**_____

Location:_____ **Condition: new** ☐ **used** ☐ **refurbished** ☐

Manufacturer's Instruction ***(note location):***_____

Initial / Date the appropriate box upon completing the requirement(s).

Monthly Maintenance

Requirements:_____

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Weekly Maintenance Requirements:_____

Month	Week 1	Week 2	Week 3	Week 4
January				
February				
March				
April				
May				
June				
July				
August				
September				
October				
November				
December				

First Environmental Laboratories, Inc.

Maintenance Record - Routine (Year____)

Instrument ID / Model No.:_____

Serial No.:_____**Date of Purchase**_____

Date Placed in Service_____**Date Taken Out of Service**_____

Location:_____**Condition: new** ☐ **used** ☐ **refurbished** ☐

Manufacturer's Instruction ***(note location):***_____

Initial / Date the appropriate box upon completing the requirement(s).

Daily Maintenance Requirements:

_____
_____
_____
_____
_____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

First Environmental Laboratories, Inc.

Maintenance Record - Routine (Year____)

Instrument ID / Model No.:_____

Serial No.:_____**Date of Purchase**_____

Date Placed in Service_____**Date Taken Out of Service**_____

Location:_____**Condition:** new ☐ used ☐ refurbished ☐

Manufacturer's Instruction ***(note location):***_____

Provide a description of the problem, the corrective action taken (CAR), whether or not the problem was resolved, down time resulting from the problem and, the cost associated with resolving the problem.

Description of Problem	CAR/ Problem Resolved (Yes / No)	Down Time	$$$$	Initials of Analyst	Date

First Environmental Laboratories, Inc.

List of Maintenance Files

Filename	Logbook No.	Description
421 ammonia ise meter	421	Ammonia Probe
421 burettes	421	Burettes
421 cod block dig	421	COD Block Digestor Techne DB3A
421 conductivity	421	Conductivity meter – SB70C
421 cyanide dist	421	Cyanide distiller - Andrews Glass
421 east dist westco	421	EASYdist unit by Westco Scientific
421 fluoride ise meter	421	Fluoride Probe
421 milton roy spec	421	Spectrophotometer - Milton Roy 401
421 ph ise meter 037445	421	pH / ISE meter - Orion 710A Wet Chem bench
421 ph ise meter SB80PI	421	pH / ISE meter – Symphony SB80PI TCLP bench
421 turbidimeter	421	Turbidimeter - HACH 2100N
brinkmann		Brinkmann digital dispensette pipets – per area
422 chiller	422	Chiller – VWR 1175MD
422 chiller	422	Chiller – VWR 1175P
422 do meter 072007	422	D.O. Meter YSI 5000
422 hg analyzer	422	Hg Analyzer - Bacharach
422 hot plates / water baths	422	Various
422 BOD incubator	422	BOD incubator – VWR 2020
422 muffle furnace	422	Muffle Furnace - Lindberg/Blue M 51700/51800
422 oven 45EG 1	422	Gravity Oven - 45EG Precision Scientific (#1)
422 oven 45EG 2	422	Gravity Oven - 45EG Precision Scientific (#2)
422 oven 1305U	422	Gravity Oven - 1305U VWR Brand
422 oven 1325	422	Gravity Oven – 1325 Sheldon
422 pensky marten fp	422	Flash Point Tester - Pensky Martens
422 refrigerator / freezers	422	Various
422 shaker	422	Eberbach
422 tclp extractors	422	TCLP Extractors
423 org instrumentation_"D"	423	Pesticides / PCBs - instrument "D"
425 org instrumentation "E"	425	SVOA GCMS – instrument "E"

Filename	Logbook No.	Description
426 org instrumentation "G"	426	SVOA GCMS – instrument "G"
428 org instrumentation "H"	428	VOA GCMS – instrument "H"
430 org instrumentation "F"	430	VOA GCMS – instrument "F"
432 eyewash stations	432	Eye Wash Stations
432 extinguishers	432	Fire Extinguishers
432 fumehood	432	Fumehood
432 safety shower	432	Safety Shower
434 m skalar sansplus	434	Skalar Sans Plus ™ 1
436 icpmaint	436	TJA Trace 61E ICP
475 skalar sansplus 2004	475	Skalar Sans Plus ™ 2
536 icipmsmaint	536	PE Elan 9000
537 org instrumentation "J"	537	Pesticides / PCBs - instrument "J"
561 conductivity portable	561	Portable conductivity meter for DI water monitoring
631 ref frez incu	631	refrigerators, freezers, incubators
649 org instrumentation "L"	649	SVOA GCMS – instrument "L"
654 oil & grease	654	Horizon SPE DEX3000
654 oil & grease	654	Speed-Vap III
mr ohaus as200s abal		analytical balance – per balance
mr top pan balances		top pan balance – per balance
1036 org instrumentation "M"	1036	VOA soil GCMS – instrument "M"
Retired Instruments / Equipment		
SVOA	424	SVOA GCMS – instrument "B"
433 m skalar aquapro	433	Skalar AQUA^{Pro} ™
turbidimeter	421	turbidimeter - HACH 2100A out of service 2005
427 org instrumentation "A"	427	VOA GCMS – instrument "A"
429 org instrumentation "C"	429	VOA GCMS – instrument "C"

9. Control of Records

9.1. Introduction

The record system is designed to produce unequivocal, accurate records that document all laboratory activities. It must allow historical reconstruction of all laboratory activities that produced the analytical data. Records are stored either electronically on external hard drive devices, CD, electronically using a web-based online filing system, or off site as hard copy files. The off site facility used for records storage has an established retrieval system. The facility is secure and it takes measures to prevent damage or deterioration and to prevent loss, including fire, theft, vermin and electronic or magnetic sources. Procedures exist to ensure that electronic records are secure and back-up routines are utilized. When not in use, external hard drive devices and CDs are stored in a fire-proof box in a safe location. All records are retained in confidence to the client. The storage time is dependent on the type of data and is specified in this document.

9.2. Technical Records

9.2.1. The laboratory records provide an audit trail and are designed to enable accurate reconstruction of the procedures / test methods.

9.2.2. The records include the identity of personnel responsible for performing each of the procedures / test method and checking of results. All data and calculations are recorded at the time they are made and are identifiable to the specific procedure / method.

9.3. Record Keeping Practices

9.3.1. All generated data, except those that are generated by automated data collection systems, are recorded directly, promptly and legibly in permanent ink. Observations, data, and calculations are recorded at the time they are made.

9.3.2. Corrections to entries are made by striking the entry with a single line. All corrections are initialed and dated by the person making the correction. The correct value should appear alongside the original entry. In the event that the cause for the correction is not obvious, the reason for the correction will be documented.

9.3.3. Obliterating, erasing, or whiting out the original entry is prohibited.

9.3.4. The records allow historical reconstruction of all lab activities that produced the data. This includes sample receipt, preparation, analysis, data reduction, and QC activities supporting the analysis procedures. The information will be such that the factors affecting the uncertainty of the test are identifiable and the test conditions could be reproduced and understood.

9.3.5. The records will be sufficient to establish an audit trail including calibration records and training records.

9.3.6. Laboratory personnel signature or initials must be on all records including sampled by, prepared by, reviewed by. The reason for the signature or initials will be clearly indicated in the record.

9.4. Records Management & Storage

9.4.1. Archived information is protected against fire, theft loss, environmental deterioration, vermin and, in the case of electronic records, electronic or magnetic source.

9.4.2. The laboratory allows the Agency (IEPA) access to archived information.

9.4.3. Records that are stored only on electronic media are supported by the hardware and software necessary for their retrieval.

9.4.4. Records that are stored or generated by computers have hardcopy or write protected backup copies. If a document revision is required, a new electronic version will be created. The original electronic document will be archived. A revision number and date is assigned to differentiate the two documents. The original file is not overwritten. The individual making the change should be identified on the document.

9.4.5. Records are retrievable for inspection and verification purposes.

9.4.6. Access to archived information is documented with an access log.

9.4.7. In the event that records have met the established retention time, the records will be destroyed prior to disposal.

9.5. Laboratory Sample Tracking

A record of all procedures to which a sample is subjected while in the possession of the laboratory is maintained. This includes documentation of the following:

- sample preservation / container;
- compliance with holding times;
- sample identification, receipt, acceptance, rejection and log in;
- sample storage and disposal;
- sample transmittal forms.

9.6. Laboratory Support Activities

A record of the following supporting activities is retained:

- All original raw data for calibration, sample analysis, and quality control measures;
- results of secondary data review;
- copies of final reports;
- archived SOPs detailing the methods used to perform analyses;
- correspondence relating to specific projects;
- all corrective action reports, audits and audit responses; and
- proficiency test results.

9.7. Analytical Records

9.7.1. Analytical Reports

9.7.1.1. Each sample submission results in the creation of a project file for retention of all correspondence related to the project and a copy of the final analytical report and invoice. Reports are archived by year and by client. Until 2007, analytical records were stored off site, except for the current year and the previous year. The storage facility uses a bar coding system for the storage and retrieval of archival records. Beginning in 2007, records have been stored electronically using a web-based online filing system

9.7.1.2. All analytical reports pertaining to environmental analyses that are associated with the laboratory's accreditation are retained for seven years

9.7.2. Raw Data

9.7.2.1. All original raw data for calibrations, samples and QC measures is retained. Data is archived by analyte group, e.g., semi-volatiles, volatiles, metals, automated wet chemistry, and non-automated wet chemistry. The details regarding the procedures used for the various analyte groups are found in SOP #822 titled, "Back-up and Archival of Electronic Document and Raw Data."

9.7.2.2. All raw data associated with sample analyses include the following information:

- laboratory sample identification code;
- date of analysis;
- instrumentation identification and instrument operating conditions or reference to such information;
- analysis type;
- calculations;
- analyst's and technician's initials or signature;
- sample preparation;
- sample analysis;
- standard and reagent receipt, preparation and use;

- calibration criteria;
- quality control protocols and assessment; and
- method performance criteria.

9.7.2.3. Appropriate information (as detailed above) must also be included on calibration curves, strip charts, computer data files, analytical labbooks, and run logs.

9.7.2.4. The raw data on external hard drive or CDs are retained for seven years.

9.8. QA/QC Records

9.8.1. Performance Evaluation (PE) Sample Records

The receipt of PE sample(s) generates a project file. The project file contains all instructions pertaining to the analysis and reporting of the PE sample, the reported results, the final results report sent by the PE provider, and any associated corrective action reports.

9.8.2. All records pertaining to the analysis of PE samples are retained for seven years.

9.8.3. Standards and Reagents

9.8.3.1 Standards logs are maintained documenting the preparation of working standards, including preparation date, concentrations and preparer's initials.

- Organics: All purchased stocks, prepared intermediate, and working standards must be entered in standards log. The number assigned the standard is listed on the standard. The standard number can be used to verify preparation date, preparer's initials, and concentrations of the standard.

- Inorganics: All purchased stocks, prepared stocks, and prepared intermediate standards must be entered in the standards log. The number assigned the standard is listed on the standard. The date of preparation, date of expiration, and preparer's initials will be listed on the sample container. The standard number can be used to verify preparation date, preparer's initials, and concentrations of the standard.

9.8.3.2. Standards and reagents are labeled with date of receipt, date of opening, expiration date, and storage requirements.

9.8 3.3. Certificates of analysis providing traceability to national standards are retained.

9.8.3.4. All records pertaining to all suppliers from whom the laboratory obtains support services or supplies required for analyses are retained for seven years.

9.9. Lab Notebooks / Log Books

9.9.1. Laboratory notebooks, instrument logbooks, and standards logbooks are assigned a unique number. A record of the assigned logbook numbers, including description of use and date, is retained. The details regarding the procedures used for the various analyte groups are found in SOP #822 titled, "Back-up and Archival of Electronic Document and Raw Data."

9.9.2. All laboratory notebooks, instrument logbooks, and standards logbooks are retained for seven years.

9.10. Corrective Action Reports, Audits, and Audit Responses

9.10.1. All records pertaining to corrective action reports, audits and audit responses are retained for seven years.

9.11. Administrative Records

9.11.1. Training Records

9.11.1.1. A copy of each analyst's resume and where applicable, diploma, is retained on file. A summary of each analyst's education, experience, and training is also retained.

9.11.1.2. Analytical training frequently requires the analysis of a series of performance evaluation samples to fulfill "Initial Demonstration of Capability". The results of IDC studies are retained on file. Each analyst has established a training file for the retention of information associated with analytical training.

9.11.1.3. All records pertaining to training are retained for a minimum of seven years.

9.12. Signatories

A record of signatures of all employees responsible for accepting samples, performing analyses, and data is retained. A copy of the current list appears at the end of this section.

9.13. Transfer of Records

In the event the laboratory transfers ownership, records would be transferred to the new owner. Clients would be notified and provided the option of having records transferred per their instruction. In the event the laboratory goes out of business, clients would be notified and records transferred to originating source where ever possible.

9.14. Electronic Data Management

9.14.1. The laboratory maintains a Laboratory Information Management System (LIMS) that is a Microsoft SQL Server based database. The LIMS is accessible throughout the lab through the local computer network. The LIMS is used to track vital information concerning samples, provide a means for data entry and generate analytical reports for our clients.

9.14..2 The LIMS software is documented through the User and Administrator Reference Manuals that were supplied with the commercially created LIMS.

9.14.3. Procedures have been established to protect the integrity of the LIMS data. See SOP #115 Electronic Data Management for more details.

9.14.4. Computer and automated equipment is maintained to ensure proper functioning and provided with the environmental and operating conditions necessary to maintain the integrity of calibration and test data. A maintenance logbook is kept to document this requirement.

9.14.5. Access to the laboratory's LIMS is restricted by user name and password to authorized employees. Permissions within the LIMS for various functions are assigned by the system administrator. Changes to archived LIMS data are not permissible.

9.14.6. Any modifications made to the LIMS must be tested and documented. This documentation is kept in a logbook.

9.14.7. The laboratory will take steps to ensure that data has been regularly backed-up. The disaster recovery procedures will allow the laboratory to recover data in event of an emergency.

9.15. References

SOP #115 titled, "Electronic Data Management".

SOP #124 titled, "LIMS Raw Data Backup".

SOP #822 titled, "Back-up and Archival of Electronic Document and Raw Data."

List of Personnel (does not include part time)	Signature	Initials
Name		
Bychowski,. John		
Cleghorn, Neal		
Franklin, Lorrie		
Gerrick, Ryan		
Gerrick, Scott		
Geraci, Joy		
Geraci, Mike		
Hentschel, Pam		
Holota, Rick		
Loj, Adam		
Mitchell, Betsy		
Mottashed, Bill Sr.		
Neises, Kim		
O'Connell, Donna		
Plagge, Irene		
Whittaker, Jeanne		
Zaworski, Brian		
Zaworski, Stan Jr.		
Zaworski, Stan (Sr.)		

10. Audits & Managerial Reviews

10.1. Introduction

10.1.1. A universal component of any sample, data, system audit performed is assessment of the data for non-acceptable or fraudulent practices that would compromise data integrity. The sample analysis process can be divided into many steps. An inappropriate or fraudulent procedure used in one step will affect subsequent steps, and ultimately, the final result of sample analysis. It is necessary to assess the sample analysis process for vulnerabilities that may affect the final result. A system of continuous improvement ensures that preventive action is incorporated into daily operations.

10.1.2. Quality audits are considered an essential part of a quality assurance program. An audit may be a performance audit that quantitatively evaluates the results of analyses or it may be a system audit that qualitatively evaluates the degree of adherence to the documented quality assurance program and Standard Operating Procedures (SOPs).

10.1.3. The Director of Data Quality will put in writing any findings from audits conducted at the lab. These will not be limited to his own audits, but will include the audits from clients and regulatory agencies. These will be shared with management and all staff, so that appropriate corrective action can be taken if necessary. Follow-up to audits verify that corrective action has actually occurred and serves the intended purpose.

10.1.4. A universal component of any of the types of audits detailed below is assessment of the data for non-acceptable practices that would compromise data integrity.

10.2. Performance Audits

10.2.1. A performance audit is a planned independent check of the operation of a measurement system to obtain a quantitative measure of the quality of the data generated. This involves the use of standard reference samples, which are certified as to their chemical composition. Two types of reference samples (performance evaluation samples) may be used: single and double blind

10.2.2. A single blind sample is known by the analyst to be a performance evaluation (PE) sample. The true values are not known.

10.2.3. A double blind sample has the appearance of a regular sample. It's identity and it's values are not known to the analysts.

10.2.4. A performance audit may also include the review of acceptability and frequency of analysis of all quality control indicators and associated control charts.

10.2.5. Performance audits are conducted as part of analyst training.

10.2.6. Performance audits are conducted as part of verifying the adequacy of corrective actions taken in response to a failed performance evaluation sample analysis.

10.3. PE Providers and Programs

10.3.1. First Environmental Laboratories routinely participated in WP, WS, and SW Performance Evaluation Programs, which consisted of the analysis of single-blind performance evaluation samples provided by the U.S. EPA. Upon discontinuation of the U.S. EPA program, First Environmental Laboratories enrolled in a program offered by an independent supplier of performance testing samples. Our current supplier, ERA, an accredited PT provider, provides Performance Testing (PT) samples for drinking water, wastewater, and solid waste fields. PT studies are conducted in accordance with the rules established by TNI. PT samples are received biannually for each field of testing, i.e., Water Supply (WS), Water Pollution (WP), SW (Solid Waste) Performance Samples.

10.3.2. PE samples may be purchased on an "as needed" basis from a variety of providers to aid in analyst training, method or instrument validation, and Corrective Action Investigations.

10.4. TNI Performance Testing (PT) Requirements

10.4.1. Initial accreditation requires the successful completion of two PT studies for each requested field of testing within the most recent three rounds attempted. The three rounds of testing need to have occurred within 18 months of the laboratory's application date. The last analysis must be within 6 months of application. The PT studies will be at least 15 calendar days apart.

10.4.2. Continued accreditation requires maintaining a history of continued successful completion of two PT studies for each field of testing out of the most recent three.

10.4.3. Completion dates of successive PT studies for a given PT field of testing will be approximately six months (5-7 months) apart. Failure to meet the semiannual schedule is regarded as a failed study.

10.4.4. The laboratory will analyze PT samples for analytes for which we are accredited that are included in the esperimental FoPT.

10.4.5. PT samples will be obtained from an approved PT provider.

10.4.6. The laboratory will authorize the PT provider to release all accreditation and remediation results and acceptable / not acceptable status directly to the Primary Accrediting Authority, in addition to the laboratory.

10.4.7. PT samples are entered into the LIMS in the same manner as actual samples. PT samples are prepared as instructed by the PT provider. PT samples will be handled in the same manner as actual samples using the same staff, methods, sample preparation procedure, sample analysis procedures, calibration procedures, equipment and instrumentation, facilities, and frequency of analysis. Decisions to reanalyze a sample or analyze at a dilution should be based on the same factors used to make decisions to reanalyze routine environmental samples. Additionally, the type, composition, concentration, and frequency of quality control samples analyzed with the PT samples shall be the same as with routine environmental samples. PT samples are not analyzed multiple times unless routine samples are also analyzed multiple times. Reporting of results is done through the LIMS in the same manner as actual samples using routine reporting limits.

10.4.8. The laboratory will not send any PT sample, or portion of a PT sample, to another laboratory for any analysis for which it seeks accreditation or continued accreditation.

10.4.9. The laboratory will not knowingly accept any PT sample or portion of a PT sample from another laboratory for any analysis for which the sending laboratory seeks accreditation or continued accreditation.

10.4.10. The laboratory management or staff will not attempt to obtain the assigned value of any PT sample from their PT provider.

10.4.11. The laboratory management or staff will not attempt to compare results of any PT sample with another laboratory.

10.4.12. All records associated with PT samples will be retained for 7 years. This includes a copy of the PT study report forms used by the laboratory to record PT results and a copy of the on-line data entry summary from the PT provider.

10.4.13. The final evaluation report will be sent by PT provider directly to the Primary Accrditing Body (AB). All records will be made available to the assessors of the Primary Accrediting Authority during on-site audits of the laboratory.

10.4.14. Whenever the result of the PT sample fail acceptance criteria, the laboratory will investigate the cause of the failure and perform appropriate corrective action. The corrective action taken will be appropriately documented. If required, a summary of the

investigation and corrective action taken will be provided to the Primary Accrediting Authority.

10.4.15. Results for PT samples are carefully monitored. If it is suspected that the laboratory may be suspended due to failing two out of three analytes within the same field of testing, a proactive approach will be used to correct the problem and analyze remedial PT sample(s) prior to actually receiving notification of suspension.

10.5. System Audits

10.5.1. A system audit is an evaluation of the laboratory's quality assurance practices and procedures. It consists of an on-site review of the laboratory's quality assurance systems and physical facilities for sampling, calibration, and measurement. The Director of Data Quality, clients or regulatory agencies can perform these audits. The results of these audits are reported to all staff and the management team. If appropriate, corrective action is initiated and documented.

10.5.2. A system audit may include any of the following:

- organization and management
- personnel
- training
- facilities
- equipment
- measurement traceability and calibration
- maintenance
- chain of custody procedures
- sample acceptance
- sample log-in and sample tracking
- storage conditions
- analytical procedures
- report format and contents
- subcontracting
- sample disposal
- document control
- review of past audits
- review of complaints
- electronic data management / LIMS system
- control charts
- SOP compliance

10.6. Method Audits

10.6.1. A method audit is a detailed evaluation of a specific method to verify compliance with the SOP / method source. A method audit may be performed as part of a system audit or as a follow-up to analyst training. It consists of a detailed review of method performance, SOP content, QCIs, control charts, and data handling. The Director of Data Quality, clients or regulatory agencies can perform these audits. The results of these audits are reported to the analyst(s), supervisor(s), and the management team. If appropriate, corrective action is initiated and documented.

10.6.2. Method audits are also triggered when a new revision or edition of the method becomes available through the originating source. The new revision or edition is evaluated against the current SOP. Changes are identified and a recommendation is made regarding the status of the SOP. If needed, the SOP will be revised. Documentation is retained in the SOP file summarizing the review.

10.7. SOP Audit

10.7.1. SOPs will be audited for accuracy prior to training a new analyst. The content of the SOP is compared to the procedures actually performed. If needed, the SOP will be revised. Documentation of the review will be retained. SOPs are audited at a minimum of every five years.

10.8. Sample Audit

10.8.1. A sample audit is a detailed evaluation of a specific project. It consists of a detailed review of chain of custody record(s), sample acceptance compliance, case narrative / cover letter, Analytical Report, raw data, QCIs, and method compliance. The Director of Data Quality or a Project Manager can perform these audits. The results of these audits are reported to staff, as needed, and the management team. If appropriate, corrective action is initiated and documented.

10.8.2. A sample audit should also include review of chemical relationships. A list of most common relationships follows:

Cation-Anion balance:
For complete mineral analysis: (Anions)=(Cations)
Conductivity and TDS
TDS= 0.65 x Conductivity
COD, BOD, TOC
COD>BOD
BOD>TOC
COD>TOC
Hardness and Ca/Mg
Hardness as Ca Co3 (mg/L) = 2.497 Ca + 4.118 Mg
Solids
TS = TSS + TDS
TSS = TS – TDS
TDS = TS-TSS
Chromium, total
(Cr total) = (Cr III) + (Cr VI)
(Total Kjeldahl N) = (Org Nitrogen) + (Ammonium Nitrogen)
Total Concentration ≥ Dissolved Concentration

10.9. Internal Audit

10.9.1. A comprehensive internal audit will be conducted annually to verify that the laboratories' operations continue to comply with the requirements of the quality system. Where the results of the internal audit indicate that operations or procedures are not in compliance, corrective action is taken. Where results of the internal audit indicate that the laboratory's test results are invalid, the laboratory takes immediate corrective action and immediately notifies, in writing, any clients whose data are affected. In the event that inappropriate actions violating the Code of Ethics is discovered, procedures for investigation outlined in the Data Integrity & Ethics SOP are followed.

10.9.2. Trained and qualified personnel who are, wherever resources permit, independent of the activity being audited will conduct the audit. The Director of Data Quality is responsible for coordinating the internal audit.

10.9.3. Attached to the Audit SOP (#121) is a checklist used to perform the annual internal audit. This checklist will be revised as necessary.

10.10. Managerial Review

10.10.1. Annually the Director of Quality Assurance will provide a "Quality Report to Management (QRM). The outline for this report includes but is not limited to the following issues:

- Internal Audit Results
- External Audit Results
- Summary of PT Program
- Listing of CARs PT Samples
- Listing of CARs by Analyte
- Listing of CARs by Client
- Preventive Action / Followup
- Continuous Improvement
- Customer Complaints
- Review of Customer Requests for Additional Services
- Customer Survey
- Review of Employee Complaints / CAR
- Data Integrity & Ethics
- Regulatory Review
  - CCDD
  - Leaking Underground Storage Tank Program
  - Site Remediation Program
  - Tiered Approach to Corrective Action Objectives
  - RISC (Indiana)
  - Ground Water Regulations
  - Safe Drinking Water Act Regulations
  - Wastewater Regulations
  - TNI
- Method Review
  - EPA Wastewater Methods
  - Solid Waste Methods
  - Standard Methods
  - Method Audits
- MDLs
- IDCs
- STATs
- QC Module
- LIMS / Computers / Software
- Review of Laboratory Sections / Instrumentation (old / new)
  - Metals
  - Conventionals
  - Wastewater
  - Pesticides/PCBs
  - Semi-volatiles

Volatiles
- Subcontracting
- Training (Summary of Active Training)
- Document Review / Revision
  - QA Manual
  - CHP
  - Policy Manual
  - SOQ / Service Brochure
- SOP Revision
- Safety

10.10.2. The internal audit conducted in conjunction with the preparation of the Quality Report to Management (QRM).

10.10.3. The laboratory management team will review all audit findings and the associated corrective action response.

10.10.r. The management team will also consider the results of external and/or performance audits, feedback from employees and clients, changes in volume or type of work, changes in personnel requirements, and any other relevant issues.

10.10.5. The management team shall review the laboratories' overall performance with respect to maintaining data integrity. Vulnerabilities will be identified and actions taken to prevent potential issues from occurring.

10.10.6. If necessary, changes in the quality systems and/or technical operations and various manuals will be made to ensure continuous improvement of the laboratory.

10.10.7. The management team will ensure that corrective actions resulting from annual review and discussion of the quality systems, technical operations, and laboratory manuals occur within an agreed upon time frame. Followup activities need to be tracked.

10.10.8. A record will be maintained recording the results of the management team's annual review and discussion of the quality system, technical operations, and laboratory manuals. Final actions will be summarized and included in the record.

10.10.9. The finalization of the internal audit findings and QRM will include a discussion by management regarding needed improvements and potential sources of nonconformances, either technical or concerning the quality system. The objective is to proactively identify opportunities for improvement and prevent deviations from the quality systems that actively ensure the data produced by the laboratory continues to meet certification and regulatory requirements.

10.11. Quality Assurance Plan – Review

10.11.1. Biannually, the Director of Quality Assurance will review the Quality Assurance Manual (QAM) for compliance with the current rules for certification. The title page of the QAM states the following:

"This QAM is reviewed annually and if necessary a section(s) will be revised to reflect current practices and certification requirements. This QAPP establishes protocols of operation for the analysis of environmental samples. Drinking water, wastewater, groundwater, soils, sediments, and waste samples are analyzed by this laboratory for iorganic and organic analytes."

10.11.2. Obsolete versions of the QAM are retained for reference for a minimum of seven years.

10.12. Quality Assurance Discussions.

Quality Assurance topics are incorporated into the weekly meeting held with all staff. Topics discussed and documented at the meeting could include:

- Results of performance evaluation samples
- Training issues
- Analytical methods
- Results of audits
- Certification issues
- Corrective action
- SOPs

10.13. References

SOP #121 titled, "Audit".
SOP #126 titled, "PT Program"

11. Personnel

11.1. Introduction

First Environmental Laboratories, Inc. staff members are of the highest quality. Personnel are qualified on the basis of education, training, experience and/or demonstrated skills appropriate to their function in the laboratory. The laboratory environment encourages growth of the individual through cross training and, where appropriate, continued education. Potential areas for growth are identified during annual reviews based on present and anticipated needs of the laboratory. Anticipated short term and long term needs are evaluated.

All personnel are responsible for complying with quality assurance and quality control requirements established by the Quality System that pertain to their function. And all personnel must demonstrate knowledge of our operations and their specific functions.

Demonstration of method performance and analyst's capability is a vital part of the formal quality control program supporting the quality of data produced by *First Environmental Laboratories.*

11.2. Analyst Training

11.2.1. Laboratory management is responsible for defining the minimal level of qualification, experience, and skills necessary for all positions in the laboratory and ensuring that sufficient personnel having necessary knowledge and skills are employed,

11.2.2. The Director of Data Quality will coordinate training and is responsible for developing a training plan outlining the stages of training.

11.2.3. An analyst who is known to be proficient and experienced at performing the analysis/instrument operation will coach analysts who are learning how to perform an analysis or operate an instrument.

11.2.4. The coach and/or Director of Data Quality is responsible for verifying the adequacy of the trainee's basic laboratory skill such as balance use, pipet use, and general chemical handling.

11.2.5. The coach (or trainer) will be responsible for reviewing all data produced by the new analyst until successful completion of initial demonstration of capability. Normally, an analyst new to a particular area of responsibility is designated as being an "analyst-in-training" for the first year. The analyst-in-training will continue to work closely with another analyst during this period.

11.2.6. When a work cell is employed, and the members of the cell change, the new employee(s) must work with experienced members of the work cell and demonstrate acceptable performance through acceptable continuing performance checks such as Procedure Blank and Laboratory Control Standard (LCS).

11.2.7. Results of the Initial Demonstration of Capability (IDC) are retained in the analysts' training file for each test method the analyst is primarily responsible for perfoming. .

11.2.8. Each analytical area (metals, extractable, conventionals, wastewater, and volatiles) maintains a manual containing pertinent method SOPs and supporting SOPs. The analyst-in-training is responsible for reading and understanding all SOPs contained in the manual.

11.2.9. All employees receive a copy of the Quality Assurance Plan and Chemical Hygiene Plan upon hire and are responsible for reading and understanding these documents.

11.2.10. If outside training is incorporated into an analyst's training plan, appropriate documentation will be included in the analyst's training file.

11.2.11. Wherever appropriate, personnel will be cross-trained in order to provide a greater depth of knowledge to the anlayst and to provide a flexible pool of analysts capable of performing a variety of analyses.

11.3. Training Files

11.3.1. Training files are maintained by the Quality Assurance Officer

11.3.2. The file is reviewed annually by the QA Officer to ensure that documentation requirements are continuing to be met. Annual review is performed during the first quarter. A new analyst that is actively being trained will work closely with the QA officer to up date their training file as various stages of training are completed.

11.3.3. A copy of the analyst's educational and professional qualification, if applicable, summary of experience and external training is also retained in the analysts' training file.

11.3.4. Continuing Demonstation of Capability (CBC) is maintained for each test method the analyst performs.

11.3.5. Records are readily available for review.

11.4. Initial Demonstration of Proficiency

Demonstrating proficiency at performing an analysis or a given suite of analyses will include the following:

11.4.1. Performing, calculating, and interpreting a Method Detection Limit (MDL) study.

11.4.2. Performing, calculating, and interpreting an Initial Demonstration of Capability (IDC) consisting of four replicate standards prepared at a known concentration.

Perform Initial Demonstration of Capability (IDC). The source for the IDC standard is either a quality control (QC) check sample obtained from an appropriate source, such as ERA, APG, or USEPA, or a standard prepared using a standard source that is different from that used in instrument calibration. The concentration of the IDC should ideally be 5-50 times the MDL or 1-4 times the Limit of Quantification (or reporting limit). Four aliquots of standard are analyzed according to the method. The standards are processed through the entire analytical procedure, including sample preparation. Concurrent analysis is not required. Calculate the mean value, mean percent recovery, standard deviation of replicates, and percent relative standard deviation of replicates for each analyte. **Criterion**: Compare percent relative standard deviation and average recovery to the corresponding acceptance criteria for precision and accuracy in the approved test method. If information is not available, refer to Table 1020 I in the 18th Edition of Standard Methods (see last page of this SOP). An excel form is available for calculating and recording results of the IDC studies.

Table 1020:I Acceptance Limits for Duplicate Samples and Known Additions to Water and Wastewater (from Standard Methods, 18th Edition – Partial Excerpt)

Analysis	Recovery of Known Additions (%) *
Metals	80-120
Volatile Organics	70-130
Base/neutrals	70-130
Acids	60-140
Organochlorine Pesticides	50-140
Endosulfans	25-140
Endrin Aldehyde	25-140
Anions	80-120
Nutrients	80-120
Other Inorganics	80-120

Additions calculated as % of the known addition recovered

11.4.3. If data collected from four QCI samples, such as the LCS, is used to calculate the IDC, then the concentration guideline may be exceeded. If a QC sample is purchased, the concentration is usually determined by the supplier and the concentration guideline may be exceeded. Evaluate the IDC carefully and determine whether the goal has been achieved. The goal is to document adequacy of training and the ability of the analyst to perform the method acceptably.

11.4.4. Successful analysis of blind performance evaluation sample(s). PE samples may be blind standards prepared by a different analyst or purchased from ERA or other supplier. In some cases, the IDC may also serve as the single blind PE.

11.4.5. Demonstrating knowledge of the method references and supporting SOPs and/or bench references.

11.5. Certification Statement (Demonstration of Capability)

11.5.1. The following certification statement shall be used to document the completion of each demonstration of capability. A copy of the certification statement shall be retained in the personnel records of each affected employee and in the method / instrument validation file in order to document the initial validation effort.

11.5.2. If a work cell is employed, the performance of the group will be linked to the training record of the individual members of the work cell. The names of the analyst's making up the work cell will appear on the documentation form.

11.5.3. Certification Statement

Attach copy of IDC if applicable.
The following certification statement shall be used to document the completion of each demonstration of capability. A copy of the certification statement shall be retained in the personnel records of each affected employee and/or in the method / instrument validation file in order to document the initial validation effort.

Date: Page 1 of 1
Laboratory Name: ***First Environmental Laboratories, Inc.***
Laboratory Address: 1600 Shore Rd. Suite D, Naperville IL 60563
Analyst(s) Name(s) or Work Cell ID:

Matrix: Aqueous Drinking Water Solids Chemical Waste

Method Number	SOP#	Revision #	Class of Analytes or Measured

We, the undersigned, CERTIFY that:
1. The analysts identified above, using the cited test method(s), which is in use at this facility for the analyses of samples under the National Environmental Laboratory Accreditation Program, have met the Demonstration of Capability.

2. The test method(s) was performed by the analyst(s) identified on this certification.

3. A copy of the test method(s) and the laboratory-specific SOPs are available for all personnel on-site.

4. The data associated with the demonstration capability are true, accurate, complete and self-explanatory (1).
5. All raw data (including a copy of this certification form necessary to reconstruct and validate these analyses have been retained at the facility, and that the associated information is well organized and available for review by authorized assessors.

_____ _____
Technical Director's Name and Title Signature
Date_____

_____ _____
Quality Assurance Officer's Name Signature
Date_____

(1)

- True: Consistent with supporting data.
- Accurate: Based on good laboratory practices consistent with sound scientific principles/practices.
- Complete: Includes the results of all supporting performance testing.
- Self-Explanatory: Data properly labeled and stored so that the results are clear and require no additional explanation.

11.6. Continuing Demonstration of Proficiency

Analysts must have on file continued documentation certifying that they have read, understood and agreed to perform the most recent version of the method and standard operating procedures AND documentation of continued proficiency by at least one of the following once per year:

- acceptable performance of a blind sample;
- another demonstration of capability;
- successful analysis of a blind performance sample on a similar test method using the same technology (e.g., GCMS volatiles by purge and trap for Methods 524.2, 624 or 5035/8260) would only require documentation for one of the test methods;
- at least four consecutive laboratory control samples with acceptable levels of precision and accuracy;
- if none of the above can be performed, analysis of authentic samples with results statistically indistinguishable from those obtained by another trained analyst.

Analyst's Name_____

Area of Responsibility_____

As part of my responsibilities, I have routinely participated in the analysis of performance evaluation samples, such as, WP, WS and ERA or equivalent as detailed above.

I have read, understood and agree to perform the most recent version of the method and/or standard operating procedure(s).

Signature_____

Date:_____

Note: Attach appropriate documentation that proves how this requirement has been met.

11.7. Laboratory Management Responsibilities

Laboratory management is responsible for all activities ensuring the production of quality data and the continued health of the company, including the following:

- staffing;
- supervision of employees;
- training , initial and continued;
- documentation of all analytical and operational activities;
- sample management, including sample acceptance, login, storage, disposal, and tracking;
- analysis and reporting;
- report preparation;
- quality; and
- data integrity and ethics.

11.8. Data Integrity Training

Data integrity is inherently critical to the success of our laboratory. All Training is provided as part of new employee orientation and is reviewed annually with all employees. A signature attendance sheet and minutes are maintained to document annual training.

Training includes, but is not limited to the following:

- mission statement;
- ethics agreement;
- ethical behavior;
- unethical behavior;
- reporting and investigation of potentially unethical behavior;
- case narratives;
- consequences;
- initial training;
- annual refresher training; and
- documentation.

SOP #127 titled, "Data Integrity & Ethics" provide detailed discussion of each of the items listed above. It discusses the need for honesty and full disclosure in all analytical reporting, how and when to report data integrity issues, and record keeping. It also discusses the consequences associated with violating the Code of Ethics, including termination or civil/criminal prosecution.

Data integrity training communicates the importance of proper written narration on the part of the analyst with respect to those cases where analytical data may be useful, but are in one sense or another partially deficient.

11.9. Annual Refresher Training

Annually, refresher training is provided during which data integrity ethics procedures are reviewed and discussed.

11.10. References

SOP #106 titled, "IDC & IDMP"
SOP #109 titled"MDL"
SOP #117 titled "Training"
SOP #127 titled, "Data Integrity & Ethics"

12. Accomodation and Environmental Conditions

12.1. Introduction

12.1.1. *First Environmental Laboratories, Inc.* conducts metals, conventionals, GC, and GC/MS analyses on drinking water, aqueous, solid, and hazardous waste sample matrices.

12.1.2. The laboratory facilities and environmental conditions must accommodate instrumentation and analysis needs necessary to produce quality data. Environmental conditions include electrical supply, lighting, temperature, humidity, water sources, sound and vibration levels, and dust.

12.1.3. The laboratory will ensure that environmental conditions do not invalidate test results or adversely affect the required quality of any measurement.

12.1.4. If the method requires monitoring of any environmental condition, the laboratory will meet and document adherence to the specified environmental condition. If the environmental condition jeopardizes the results of the test, the analysis will be stopped until the condition is corrected.

12.2. Facilities

12.2.1. Adequate workspace must be available to provide an unencumbered work area for the performance of the various analytical procedures. This includes sample receipt and log-in, sample storage, chemical and waste storage, and data handling and storage areas.

12.2.2. Access to the laboratory is always controlled. The extent of control is based on circumstances.

12.2.3. The laboratory is designed, operated and arranged to separate incompatible analyses minimizing the potential for sample contamination.

12.2.3.1. Volatile samples are stored in an area separated from other lab activities and samples.

12.2.3.2. Volatiles analyses are conducted in a separate lab dedicated to volatile analyses.

12.2.4. Adequate measures are taken to ensure good housekeeping in the laboratory. Poor housekeeping can have an adverse affect on the quality and reliability of data being produced. Special procedures are developed and used as necessary.

- All passageways are kept clean and free from obstruction.
- Access to all exits and emergency equipment is unobstructed.
- All storage areas are kept neat and orderly.
- Floors are kept as clean and dry as possible.
- Work areas are cleaned regularly.
- All chemicals are properly labeled and stored.
- All glassware that contained hazardous chemicals is rinsed before being given to the glassware cleaning personnel.
- Sample receipt area is kept neat and orderly.
- Data handling areas are managed to meet record keeping requirements.

13. Environmental Test and Calibration Methods, and Method Validation

13.1. Introduction

The laboratory uses appropriate methods and procedures for all environmental tests within its accreditation. These methods and procedures are documented in the laboratory Standard Operating Procedures (SOPs) and this Quality Assurance Manual. Each instrument method is validated prior to institution by performing a initial demonstration of capability.

13.2. Standard Operating Procedures

13.2.1. As a supplement to the methodology provided in the actual method references, First Environmental Laboratories, Inc. has established written Standard Operating Procedures that provide detailed instructions for analysis. All employees will follow the policies and procedures detailed in the SOPs and outlined in the QAM. Laboratory management must approve deviations from documented policies and procedures. The Project Manager will approve specialized project requirements that deviate from routine procedures on an individual basis. The SOP's contain detailed information regarding the following:

- Header Information (filename, SOP#, revision #, date, pagination)
- Title
- Scope and Application
- Summary of Method
- Matrices
- Sample Collection, Preservation, and Storage
- Equipment & Supplies
- Reagents and Standards
- Interferences
- Calibration and Standardization
- Procedures
- Quality Control
- Data Assessment and Acceptance Criteria for Quality Control Measures
- Corrective Action for Out-Of-Control Data
- Contingencies for Handling Out-Of-Control Or Unacceptable Data
- Data Analysis and Calculations
- Detection Limits & Reporting Limits
- Method Performance
- Tables, Diagrams, Flowcharts, & Validation Data
- Definitions

- Safety
- Pollution Prevention
- Waste Management
- References
- Approvals
- Implementation Date
- Ending Date

13.2.2. The SOPs also provide information regarding any modifications or clarifications to the approved test method.

13.2.3. In some cases, bench references have also been prepared to complement the SOP. A bench reference is designed to be used by an experienced analyst.

13.2.4. Additional non-method SOPs have been prepared to accurately specify protocols and procedures for all phases of laboratory activity including sample acceptance, login, handling, preparation, storage, and disposal. Several SOPs support training activities and it is understood that information in an SOP used for training is more generic than a method specific SOP. Therefore, if information in the training document conflicts with information in the method SOP, the method SOP takes precedence.

13.2.5. A complete listing of current SOPs is included in this section. Each SOP is assigned a unique numeric ID.

13.2.6. Laboratory personnel have access to all SOPs.

13.3. Approved Method References

13.3.1. The laboratory cites methods from the various references listed below. The most recent valid revision is used unless it is not appropriate. In the event that the client does not specify the method to be use, the laboratory uses methods for testing that are judged appropriate and intended to meet the needs of the client. In some instances, the client may mandate or request the method to be used. If the requested method is not appropriate, the laboratory notifies the client.

13.3.2. The method references are available within the laboratory to all personnel. Methods cited by the laboratory are fully validated. Validation data and supporting documents, such as SOPs, and documentation associated with Demonstration of Capability (DOC) are available for review.

13.3.3. The method used for analysis is listed on the Analytical Report.
13.3.4. Common Method References

"Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods", SW-846, Third Edition, July 1992 and it's updates.

"Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020, Revised March 1983.

"Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater,", EPA 600/4-82-057, Revised July 1982.

"Standard Methods for the Examination of Water and Wastewater", 20th Edition, 1998.

"Standard Methods for the Examination of Water and Wastewater", 21st Edition, 2005.

"Methods for the Determination of Organic Compounds in Drinking Water" EPA/600/4-88/039, July 1991.

"Methods for the Determination of Organic Compounds in Drinking Waters – Supplement II," EPA/600/R-92/29, August 1992.

"Methods or the Determination of Inorganic Substances in Environmental Samples," EPA/600/R-93/100, August 1993.

"Methods or the Determination of Metals in Environmental Samples – Supplement I," EPA/600/R-94-111, May 1994.

"Technical Notes on Drinking Water Methods," EPA-600/R-94-173.

"N-Hexane Extractable Material (HEM) and Silica Gel Treated N-Hexane Extractable Material (SGT-HEM) by Extraction and Gravimetry," EPA-821-R-98-002, Feb. 1999.

ASTM Methods – various

13.4. Methods

Matrix →		Drinking Water and Wastewater		Soil, Waste, Ground Water	
	Reporting Limit	Method No. from Standard Methods (20th Ed.) and/or EPA Wastewater Method Manuals	Accredited	Method No. from SW-846 or ASTM	Accredited
Analyte and default unit (as it appears on the report)					
Inorganics					
Acidity as $CaCO_3$ - mg/L	5	2310B	Y	----	
Alkalinity as $CaCO_3$ - mg/L	5	2320B	Y	----	
Ash - %	0.01	2540E	N	----	
BOD and CBOD – mg/L	1	5210B	Y	----	
Bottom, Sediment & Water, %	1	----		D1796	N
Chloride (automated) - mg/L	5	4500Cl⁻-E	Y	9251	Y
Chloride (titration) - mg/L	5	4500Cl⁻-C	Y	----	
Chlorine, free or residual - mg/L	0.05	4500Cl-G	Y	----	
Chlorine, total - mg/L	0.05	4500Cl-G	Y	----	
Chromium, hexavalent - mg/L	0.005	3500Cr-B	Y	7196A	Y
COD (low) - mg/L	10	5220D	Y	----	
COD (high)	--	5220D	Y	----	
Color, APHA	20	2120B	Y	----	
Conductivity - umhos/cm	5	2510B	Y	9050A	N
Cyanide Automated, mg/L	0.005	335.4R1.0[3]	Y	----	
Cyanide, total & ammenable- mg/L	0.005 0.10 soil	4500CN-B,C,E,G	Y	9010B/9014	Y
Cyanide, reactive - mg/kg	10	----		7.3.3.2.	Y
Cyanide, weak acid dissociable – mg/L	0.005	4500CN-I	N	----	
Density, g/cc	0.01	----		D854-92	N
Fluoride - mg/L	0.50	4500F-C	Y	----	
Flash Point - °F, open cup	212°F	----		1010M	N
Flash Point - °F, closed cup	212°F	----		1010	Y
Ignitability of Solids	--	----		1030	N
Fractional Organic Carbon Content @ 440°, %	0.01	----		D2974-87	N
Hardness (titration) - mg/L	5	2340C	Y	----	
Ammonia Nitrogen (automated) – mg/L	0.10	350.1R2.0[3]	Y	----	
Ammonia Nitrogen as N (probe) -	0.10	4500NH_3-B,D	Y	----	

mg/L					
Matrix →		**Drinking Water and Wastewater**		**Soil, Waste, Ground Water**	
	Reporting Limit	**Method No. from Standard Methods and/or EPA Wastewater Method Manuals**	**Accredited**	**Method No. from SW-846 or ASTM**	**Accredited**
Analyte and default unit (as it appears on the report)					
NALP (Present vs. Not Present)	--	----		----	
Nitrite Nitrogen as N - mg/L	0.01	4500NO_2-B	Y	----	
Nitrate + Nitrite Nitrogen (automated) as N - mg/L	0.10	353.2R2.0[3]	Y	----	
Nitrate (automated) – mg/L	0.10	353.2R2.0[3]	Y	----	
Nitrate – mg/L	0.10	4500NO_3 E modified	Y	----	
MBAS – mg/L	--	SM5540C	Y	----	
Oil & Grease - mg/L	1	1664A[1]	Y	9070A	N
Oil & Grease (sludge /sediment) – %	0.01	----		9071B	Y
Moisture, %	0.01	----		D4959-89	N
Paint Filter - free liquid present or absent	--	----		9095A	Y
Phenol Automated, mg/L	0.01gw	420.4R1.0[3]	Y	9066	N
Phenol (direct) - mg/L	0.05 0.01gw 2.5 soil	420.1	Y	9065	Y
Phosphorus, total - mg/L	0.01	4500P-B,E	Y	----	
Phosphate, ortho - mg/L	0.01	4500P-E	Y	----	
pH @ 25°C – units (aqueous)	--	4500H^+-B	Y	9040B	Y
pH @ 25°C, 1:10 – units (soil)	--	----		9045C	Y
Settable Solids, mg/L	1	2540F	Y	----	
Silica - mg/L	1.0	4500 -Si,C	Y	-----	
Specific Gravity	0.01	2710F	N	----	
Sulfate Automated - mg/L	15	375.2R2.0[3]	Y	9036	N
Sulfate - mg/L	15	----		9038	Y
Sulfide, total colorimetric - mg/L	0.05	4500S_2^-C,D	Y	----	
Sulfide, total titrimetric – mg/L	5	----		9034	Y
Sulfide, reactive mg/kg	10	----		7.3.4.2.	Y
Sulfur, %	0.01	----		E775-87	N
TDS - mg/L	1	2540C	Y	----	
TSS - mg/L	1	2540D	Y	----	

TS - mg/L	1	2540B	Y	----	
TKN - mg/L	--	4500N-B	Y	----	
Matrix →		**Drinking Water and Wastewater**		**Soil, Waste, Ground Water**	
	Reporting Limit	**Method No. from Standard Methods and/or EPA Wastewater Method Manuals**	**Accredited**	**Method No. from SW-846 or ASTM**	**Accredited**
Analyte and default unit (as it appears on the report)					
TOC, mg/	0.1	5310C	Y	9060	Y
Turbidity - NTU	0.01	2130B	Y	----	
Metals					
Mercury – mg/L or mg/kg	0.0005aq 0.05 soil	245.1R3.0[2]	Y	7470A	Y
ICP (aqueous) – mg/L		200.7R4.4 [2]	Y	3010A/6010B	Y
ICP (soil) – mg/kg		200.7R4.4 [2]	Y	3050B/6010B	Y
ICP – MS		200.8R5.4	Y	3010A/6020	Y
SPLP	--	----		1312	Y
TCLP / ZHE Prep	--	----		1311	Y
Organics, Analyses					
Analyte Group	**Prep Method Water**	**Prep Method Soil**	**Method No. from Standard Methods and/or EPA Wastewater Method Manuals**	**Accredited**	**Method No. from SW-846 or ASTM**	**Accredited**
BTEX	5030B	5035	--		8260B	Y
EDB/DBCP	--	--	--		8011	Y
Pesticides	3510C	3540C	608	Y	8081A	Y
PCBs	3510C	3540C	608	Y	8082	Y
PNAs	3510C	3540C	625	Y	8270C	Y
Semi-volatiles	3510C	3540C	625	Y	8270C	Y
TPH	3510C	3540C	--		8015B	Y
Volatiles	5030B	5035	624	Y	8260B	Y

13.5. Custom Procedures / Non-Standard Methods

13.5.1. Custom procedures / non-standard methods may be developed by the laboratory at the request of the client. The Project Manager will ensure that the client specifications are clear and achievable. The purpose of the test will be understood prior to planning the test development. Personnel with appropriate experience and knowledge will work with the Project Manager and Director of Quality Assurance to ensure that the procedures are properly developed, validated and documented.

13.5.2. If it is necessary to use non-standard methods, the client will be notified during the project planning phase. Non-standard methods will be appropriately validated before use for precision, accuracy, and range of analysis to verify the ability to meet the intended use of the method. Validation will be as extensive as needed to meet the intended use of the method. At a minimum, the validation requirements established for routine methods will be met.

13.5.3. All documentation relating to non-standard method development and validation, and the acceptability of the method for its intended use will be retained.

13.6. Instrument / Method Validation (Demonstration of Capability)

13.6.1. Initial demonstration of method performance may include any or all of the following: defining the linear calibration range; determining the method detection limit and routine reporting limit; demonstrating the precision and accuracy of the analysis by performing an Initial Demonstration of Capability (IDC), and analysis of Performance Evaluation (PE) samples. Additional validation requirements may be established based on specific situational needs.

13.6.2. The ability to reliably produce quality data is dependent upon the maintenance and quality control monitoring routines established at the time the instrument or method is validated. For instrument and method validation to be complete, these routines must be established prior to analyzing samples submitted by clients.

13.6.3. It is understood that, in some cases, the routines initially established at the time the instrument or method is validated will need to be revised. Therefore, a follow-up date is established upon completing instrument or method validation. Follow-up includes assessing all aspects of instrument or method performance, flow of work through the lab, and the effectiveness of maintenance and quality control monitoring routines. The follow-up will also include an audit of an arbitrarily chosen set of data.

13.6.4. It is vital that the SOPs prepared to support instrument operation and method performance match procedures performed on an everyday basis. Each SOP will be reviewed for completeness and accuracy upon completion of the validation, and at the time follow-up is performed.

13.6.5. Demonstration of capability must be completed prior to the acceptance of samples and each time there is a change in instrument type, personnel, or method.

13.7. Control of Data

13.7.1. Data Review / Verification

13.7.1.1. Review of the analytical data based upon set acceptance/rejection criteria established by the analytical method is necessary to ensure the quality of the data. This process involves a critical review of the data set in order to detect questionable values. The analyst performs the initial and most critical review at the time the data is generated.

13.7.1.2. The analyst is provided with detailed method performance acceptance criteria for each analytical method. These criteria are outlined in the specific method SOPs. Data that fails to meet the criteria specified must be flagged appropriately, and the Project Manager notified. Specific information regarding the "out-of-control" QCI will be provided in the case narrative prepared by the Project Manager.

13.7.1.3. Analyst-in-Training are required to have their data reviewed by the senior anayst responsible for conducting the training or other qualified analyst. The training period normally consists of a year. When appropriate to the training effort, checklists are created to assist in the training process. These checklists are reviewed by the senior analyst as part of the review of sample results.

13.7.2. Calculations and Data Transfers

13.7.2.1. Upon completion of data entry the Project Manager reviews the data verifying the accuracy of units of measure, reporting limits, significant figures, adherence to holding times, reasonableness, and completeness. Evaluative tools, such as anion/cation balance, may be utilized to assess the data. If a questionable value is found, the raw data is reviewed and the calculations checked. If necessary, the Project Manager may request re-analysis in order to verify the questionable data. After this review is completed, the Project Manager generates the final report and case narrative. The case narrative details any deviations from routine protocols that have occurred or failures to meet data quality objectives.

13.7.2.2. Another Project Manager performs secondary review of each report.

13.7.3. Manual Calculations

Detailed formula for performing calculations are included in the method SOPs and QC SOPs.

13.7.4. Computerized Procedures & Calculations

13.7.4.1. Computer software used by the laboratory is documented and validated prior to use.

13.7.4.2. Electronic data is protected and secure.

13.7.4.3. Computers and automated equipment is maintained to ensure proper functioning.

13.7.4.4. User accounts to the LIMS are user ID and password protected to prevent unauthorized access to, and the unauthorized amendment of, computer records.

13.7.4.5.

13.8. References

SOP #106 titled, "IDC & IDMP"
SOP #115 titled, "Electronic Data Management"
SOP #125 titled, "Data Validation"
SOP #811 titled, "LIMS Sample Login"
SOP #812 titled, "LIMS Sample Worksheets"
SOP #817 titled, "LIMS Data Entry"
SOP #818 titled, "LIMS Data Reporting"

List of SOPs

R# = Revision #

QA	#	R#	Revised
balance calibration	101	3	01/04/10
calibration curves, inorganic	102	3	02/02/06
idc & idmp	106	4	01/24/06
maintenance	108	4	02/01/06
mdl	109	2	01/18/06
pipet / syringe calibration	111	4	09/12/06
statistical control	112	4	06/14/11
thermometer	113	4	10/20/08
calibration curves, organic	114	2	02/03/06
electronic data management	115	4	02/14/06
evidentiary COC	116	2	05/27/04
training file doc prof	117	6	04/13/11
measurement traceability...	118	1	08/31/99
sample acceptance....	119	4	08/06/08
audit	121	1	09/23/99
Checklist to audit SOP	121	3	07/19/04
subcontracting	122	4	03/10/10
sampling instruction & mat.	123	3	02/03/06
data validation	125	2	04/17/01
PT samples	126	3	03/02/06
data integrity	127	2	02/07/06
sop preparation	128	2	09/10/05
QCI - Inorganics & Organics	129	1	02/02/06
Creating Control Charts Agilent	130	1	01/23/07
Manual Chromatographic Integration	131	1	09/15/08
Manual Integration Skalar	132	1	09/15/08
Reprocessing Data ICPMS	133	draft	08/16/10

GCMS	#	R#	Revised
PNAs	201	3	03/30/10
semivolatiles	202	4	01/25/06
TPH as Gasoline, Diesel, Waste Oil	203	3	05/04/04
volatiles	204	7	09/05/08
volatiles, drinking water 524.2	205	4	04/14/04

TPH as Gasoline	**206**	**2**	**12/10/04**
Wood Samples	**207**	**3**	**08/26/03**

GC	**#**	**R#**	**Revised**
8011 edb	**301**	**2**	**02/26/08**
8081 pesticides	**302**	**5**	**07/28/10**
8082 pcb	**303**	**4**	**04/15/11**

Conventionals	**#**	**R#**	**Revised**
acidity	**401**	**5**	**02/08/11**
alkalinity	**402**	**5**	**02/08/11**
ammonia easy dist	**403**	**6**	**02/09/11**
ammonia, Skalar (automated)	**405**	**4**	**02/10/11**
chloride, Skalar (automated)	**406**	**4**	**02/10/11**
chloride, titrimetric	**407**	**5**	**02/09/11**
chlorine	**408**	**6**	**02/09/11**
chrome+6	**409**	**8**	**03/14/11**
cod	**410**	**6**	**02/09/11**
conductivity	**411**	**6**	**03/14/11**
cyanide	**412**	**7**	**02/08/11**
fluoride	**413**	**9**	**02/09/11**
hardness	**414**	**6**	**02/08/11**
nitrate, Skalar (automated)	**417**	**5**	**02/10/11**
nitrite	**418**	**7**	**03/14/11**
pH (separate SOP per meter)	**419**	**7**	**03/14/11**
phenol easy dist dc	**420**	**5**	**02/10/11**
phosphorus	**421**	**6**	**02/10/11**
reactivity s cn	**422**	**4**	**02/10/11**
silica	**423**	**5**	**02/09/11**
sulfate, skalar (automated)	**424**	**4**	**02/11/11**
sulfate, turbidimetric	**425**	**5**	**02/10/11**
sulfide colorimetric	**426**	**8**	**02/10/11**
sulfide titrimetric	**427**	**7**	**02/10/11**
cyanide, Skalar (auto.)	**429**	**3**	**02/14/11**
phenol, Skalar (auto.)	**430**	**3**	**02/14/11**
color	**431**	**2**	**02/17/11**
sulfide easy dist	**432**	**5**	**02/10/11**
TOC Skalar	**434**	**3**	**02/16/11**

ammonia probe	435	2	02/09/11
TKN	436	2	02/11/11
turbidity (HACH 2100N)	437	4	03/15/11
sulfite	438	2	03/17/11
pH (sb80pi) (separate SOP per meter)	439	2	03/14/11
volatile fatty acids	440	2	03/17/11
sans plus	441	2	03/15/11
ferrous iron	442	1	03/17/11

Metals

	#	R#	Revised
cec (bench reference only) obsolete	501	X	04/01/95
icproutine	502	6	10/04/07
icpstd (standards list)	503	3	08/19/10
mercury	504	8	06/08/11
splp zhe	505	3	12/26/07
tclp zhe	506	3	01/28/08
icpms	507	2	01/26/09
icpmsstd	508	3	08/01/10

Organic Prep

	#	R#	Revised
Sepfbna	601	7	02/03/11
Sepf pest pcb	602	5	02/03/11
Soxbna	603	6	02/02/11
Sox pest pcb	604	4	02/03/11
Sonication bna	605	1	10/11/07
Sonication pest	606	1	10/22/07

Wastewater

	#	R#	Revised
bod	701	7	08/20/07
flammability	702	3	02/04/11
flashpt	703	4	02/04/11
oil & grease, hexane	704	6	01/12/11
paintfilter	705	2	02/04/11
specific gravity	706	2	02/04/11
tds vds	707	5	12/19/07
ts tvs	708	5	12/21/07
tss vss	709	6	02/04/11
oil & grease, hexane / horizon	710	1	11/05/07

Aspen LIMS	#	R#	Revised
Install a Workstation	801	1	02/03/05
Install a Workstation	801	2	03/15/11
Procedure for Entering %TS	802	4	05/01/07
LIMS Creating LF EDDs	803	3	03/02/11
LIMS Org Prep	804	4	02/17/10
LIMS VOC	805	1	02/16/10
LIMS Create and Export EDDs	806	2	03/01/11
Archive LIMS Data	807	2	03/15/11
LIMS Aspen Libraries	808	2	02/23/11
LIMS Sample Login	811	3	02/22/10
LIMS BOD	813	1	01/26/06
LIMS Manual WC	814	draft	
LIMS Metals Digestion	816	2	03/17/08
LIMS Data Entry	817	4	03/01/11
LIMS Data Reporting	818	2	03/01/11
LIMS Data Flags	819	2	02/16/11
LIMS Status by Labsection	820	2	03/16/11
LIMS Export Data in Access DB Format	821	2	03/16/11
Back-up and Archival of Electronic	822	3	02/18/10
LIMS MDL	823	draft	
Create an Invoice for Republic	826	2	03/15/11
Draft LIMS QC Charts	828	1	06/14/11
Draft LIMS Add QC to a WS	829	draft	
LIMS Sample Disposal	830	1	03/15/11
Export Data from LIMS	831	1	03/15/11
Draft EDMR EDD Creation	833	draft	
Draft IT Disaster Recovery	834	draft	

Safety	#	R#	Revised
Sample disposal	901	5	01/21/11
Waste disposal	902	4	01/21/11

Office	#	R#	Revised
	100		
Purchasing	1	1	04/03/07

STATE OF ILLINOIS

ENVIRONMENTAL PROTECTION AGENCY
NELAP - RECOGNIZED

ENVIRONMENTAL LABORATORY ACCREDITATION

is hereby granted to

FIRST ENVIRONMENTAL LABORATORIES, INC.

1600 SHORE ROAD, SUITE D

NAPERVILLE, IL 60563

NELAP ACCREDITED

ACCREDITATION NUMBER #100292

According to the Illinois Administrative Code, Title 35, Subtitle A, Chapter II, Part 186, ACCREDITATION OF LABORATORIES FOR DRINKING WATER, WASTEWATER AND HAZARDOUS WASTES ANALYSIS, the State of Illinois formally recognizes that this laboratory is technically competent to perform the environmental analyses listed on the scope of accreditation detailed below.

The laboratory agrees to perform all analyses listed on this scope of accreditation according to the Part 186 requirements and acknowledges that continued accreditation is dependent on successful ongoing compliance with the applicable requirements of Part 186. Please contact the Illinois EPA Environmental Laboratory Accreditation Program (IL ELAP) to verify the laboratory's scope of accreditation and accreditation status. Accreditation by the State of Illinois is not an endorsement or a guarantee of validity of the data generated by the laboratory.

Gary Germann
Manager
Environmental Laboratory Accreditation Program

Scott D. Siders

Scott D. Siders
Accreditation Officer
Environmental Laboratory Accreditation Program

Certificate No.: 002687
Expiration Date: 02/28/2012
Issued On: 03/01/2011

Page 1 of 9

14. Equipment / Instrumentation

14.1. Introduction

The laboratory maintains supplies, equipment, instrumentation and software necessary for the correct performance of the environmental tests and procedures specified in our accreditation. The equipment and instrumentation used for testing is capable of achieving the accuracy required and complying with the specification of the environmental tests and procedure(s). Before being placed into service, instrumentation is validated in accordance with the guidance provided in Section 13. "Environmental Test and Calibration Methods, and Method Validation".

Calibration, the process of comparing one standard or piece of equipment against a standard or piece of equipment of higher accuracy, is vital to the quality of the end product. The degree of accuracy of the data generated is directly related to the accuracy of the standard or equipment.

14.2. Support Equipment

14.2.1. Support equipment includes balances, ovens, refrigerators, freezers, incubators, water baths, thermometers, pipets, and deionzied water sources.

14.2.2. All support equipment is maintained in working order and records including service calls are maintained. Malfunctioning equipment is removed from service, and clearly labeled out of service until repaired.

14.2.3. All support equipment is calibrated or verified annually over the range of use using NIST traceable references where available.

14.2.4. Balance calibration verification is performed within the expected range for the intended application each working day and records maintained.

14.2.5. Temperature verification for ovens, refrigerators, freezers, incubations and water baths is performed each working day and records maintained.

14.2.6. Glass micro-liter syringes have a certificate attesting to the established accuracy. Mechanical volumetric pipets are checked for accuracy quarterly and records are maintained.

14.2.7. Records of correction factors, if applied, are kept.

14.3. Instrument Calibration

14.3.1. The details of initial instrument calibration procedures are provided in the method specific SOPs, and in SOP #102 titled, "Calibration Curves, Inorganic", and SOP #114 titled, "Calibration Curves, Organic".

14.3.2. Raw data records are retained and must provide sufficient detail to permit reconstruction of the initial instrument calibration.

14.3.3. A calibration curve or standard curve is a comparison of the instrument response versus the concentration of the substance being measured. Typically, when plotted, the curve approximates a straight line.

14.3.3.1. For inorganic analyses, the calculation of the correlation coefficient is a test to determine whether the calibration data can be represented as a straight line. The square of the correlation coefficient is a positive number that exists between zero and one. A correlation coefficient of 1.0000 for a set of data indicates a curve of best fit. An acceptable correlation coefficient is 0.9950 or greater. The frequency at which calibration curves are prepared is specified within the methods.

14.3.3.2. For organic analyses, an average response factor is used to define the relationship of response to concentration. The percent relative standard deviation (%RSD) of the response factors is calculated for each compound in the set of calibration standards. If the %RSD is less than 20 percent then the average response factor may be used for quantitation. Linearity through the origin is not explicit and is assumed using this means of quantification. The frequency at which calibration curves are prepared is specified within the methods.

14.3.4. Sample results must be quantitated from the initial instrument calibration.

14.3.5. Results of analysis must be reported within the concentration range established by the initial calibration.

14.3.5.1. The lowest standard is equal to the reporting limit. Alternatively, if the reporting limit is below the lowest standard, the reporting limit can be verified by running a standard at the concentration of the reporting limit.

14.3.5.2. Samples exceeding the high standard are diluted and reanalyzed within the range of the initial calibration.

14.3.5.3. If calibration is performed using a zero point and a single point calibration standard (such as ICP), then the performance at the low end and the high end of the instruments range will be demonstrated on a daily basis.

14.3.5.4. If reported results are outside the instrument's calibration range and appropriate standards within the calibration range have not been analyzed to demonstrate performance, then the data will be flagged appropriately or an explanation provided in the case narrative.

14.3.5. An independent reference sample is analyzed immediately following a calibration curve to verify the curve. This standard is referred to as the Initial Calibration Verification Standard (ICVS). The ICVS must be prepared from a source different than that used to prepare calibration standards.

14.3.6. A distinction is made between recalibration, when a new curve is prepared, and continuing calibration verification, when a pre-existing curve is verified at the beginning, end, or during an analytical run. Whenever a new curve is prepared, it must be verified with an Initial Calibration Verification Standard (ICVS). Whenever a pre-existing curve is used, it must be verified with a Continuing Calibration Verification Standard (CCVS).

14.3.6.1. The CCVS is also analyzed periodically during the analytical run and at the end of a run to verify that the instrument calibration has been maintained during the run.

14.3.6.2. The CCVS may be prepared from the same source used to prepare calibration standards or from a second source.

14.3.6.3. If the CCVS results are outside established acceptance criteria, corrective action must be performed. Corrective action may require the analysis of a new initial calibration curve.

14.3.6.4. Data associated with an unacceptable CCVS may be reported with the appropriate qualification as follows:

- When the recovery for the CCVS is high biased, the results for samples having a non-detect may be reported.

- When the recovery for the CCVS is low biased, the results for samples exceeding regulatory maximum limit or decision level may be reported.

If more stringent standards or requirements are included in a mandated test method or regulation, they supercede general requirments of TNI standard.

14.4. Equipment/Instrumentation

14.4.1. Our laboratory is equipped with state-of-the-art instrumentation capable of providing a full range of analytical services utilizing EPA approved procedures, and allows us to meet the diverse needs of our clients. The equipment and instrumentation used to produce our product - analytical results - are the single most important tools we

use to provide our clients with timely and accurate data, and therefore, represent the single largest area of capital investment.

14.4.2. Critical to our ability to consistently provide our clients with timely and accurate results, is the reliability of our equipment. To ensure reliability and minimize instrument down time, we have developed and implemented a detailed in-house maintenance program for all of our equipment.

14.4.3. Below is a listing of our equipment and instrumentation:

Volatiles Analyses

- Agilent 5975B GC/MS with EST Centurion Autosampler / Dual EnCon Purge & Trap
- Agilent 5973 GC/MS with EST Centurion Autosampler. / Dual Encon Purge & Trap
- Agilent 5972 GC/MS with EST 8100 Autosampler / Dual Encon Purge & Trap
- Agilent 5975 GC/MS with EST Centurion WS Autosampler / Dual Encon Evolution Purge & Trap

Semi-Volatiles & Pesticides/PCBs Analyses

- Agilent 5975 GC/MS with 7683 Autosampler. This is Agilent's most recent benchtop GC/MS model combined with the 7890A gas chromatograph.
- Agilent 5973 GC/MS with 7673 Autosampler.
- Agilent 5973 GC/MS with 7673 Autosampler.
- Agilent 5972 GC/MS with 7673 Autosampler.
- Agilent 6890 GC with Dual Electron Capture Detectors. Agilent 6890N with dual micro electron capture detectors.
- Branson 450 Sonic Disrupter
- TCLP Zero Headspace Extraction Apparatus
- Soxhlet and Continuous Liquid-Liquid Extraction Apparatus

Metals Analyses

- Thermo Jarrell Ash ICAP 61E Trace Analyzer: This state-of-the-art instrument combines the speed and power of simultaneous ICP spectroscopy with the ability to reach part per billion and part per trillion detection levels previously only available through the more costly and time consuming graphite furnace methods.
- Coleman 50B Mercury Analyzer System
- Perkin-Elmer ELAN 9000 ICP-MS. For ultra-low detection limits of metals at the parts per trillion level and lower. The SimulScan dual-stage detector measures both high and low level analytes simultaneously.Conventionals / Wastewater Analyses

Conventionals Analyses

- Milton-Roy 401 Spectrophotometer
- Hach 2100N Turbidimeter
- Symphony Model SB70C Conductivity Meter
- YSI 5000 Oxygen Meter
- Pensky-Martens Closed Cup Flash Point Tester
- Lab Crest Cyanide Midi Distillation System
- Orion 710A Ion Selective Electrode Meter
- Skalar SANPlus Analyzer (Cyanide, Phenol, TOC)
- Skalar SANPlus Analyzer ((Nitrate, Ammonia, Sulfate, Chloride)
- Westco Scientific EASYdist
- Oil & Grease Machine SPE-DEX3000 Horizon Technology

Support Equipment

- Drying Oven (4)
- Lindberg Blue M 794 Muffle Furnace
- Refrigerators, Freezers, and Incubators
- Top Pan Balances
- Analytical Balances
- Pipettes & Syringes
- Thermometers
- DI Water Sources – General Lab
- Barnstead E Pure DI Water Source for Volatiles
- Glassware

14.5. References

SOP #101 titled, "Balance Calibration"
SOP ##108 titled, "Maintenance"
SOP #111 titled, "Pipet Calibration"
SOP #113 titled, "Thermometer"
SOP #102 titled, "Calibration Curves, Inorganic"
SOP #114 titled, "Calibration Curves, Organic"

15. Measurement Traceability

15.1. Introduction

15.1.1. All equipment having an effect on the accuracy and validity of the tests and procedures are calibrated prior to initial use and on a continuing basis over the entire range of use. The system is designed to be traceable to the International System of Units (SI) where applicable.

15.1.2. Requirements for calibration of reference standards, such as, Class S weights and NIST thermometers, are specified in the appropriate SOP. Reference standards will be calibrated before initial use and after adjustment. They will only be used for calibration purposes.

15.1.3. Internal reference standards are verified using certified reference materials.

15.1.4. Equipment used must be capable of providing the uncertainty of measurement needed per test specification.

15.1.5. Daily calibration for support equipment, such as, balances, deionized water, refrigerators, freezers, and incubators, means "each day the equipment is used."

15.2. Equipment Calibration

15.2.1. The accuracy of Grade S, Class 2 weights are certified by an independent source every five years. Balance calibration is performed annually by a contract calibration service, traceable to the appropriate National Institutes of Standards and Technology (NIST) calibration procedure over the entire range of use. Certificates of calibration are retained on file. On a monthly basis the analyst performs intermediate calibration for balances using Grade S, Class 2 weights. An assigned analyst performs daily balance calibration. See the Balance Calibration SOP for the detailed procedure.

15.2.2. The accuracy of NIST thermometer(s) are certified by an independent source every five years over the entire range of use. An analyst performs thermometer calibration against NIST thermometers annually. See the Thermometer Calibration SOP for the detailed procedure.

15.2.3. Autopipetors and re-pipetors are verified at least quarterly. See the Pipet Calibration SOP for the detailed procedure.

15.2.4. The pH meter has an accuracy of at least $\pm$ 0.1 pH units and a scale readability of at least 0.1 pH units. The meter performs temperature measurement and compensation

automatically. The meter is calibrated with two standardization buffers prior to each use. See the pH SOP for the detailed procedure.

15.2.5. The conductivity meter is calibrated prior to each use. See the Conductivity SOP for the detailed procedure.

15.2.6. The turbidity meter is calibrated prior to each use. See the Turbidity SOP for the detailed procedure.

15.2.7. Refrigeration units, freezers, ovens, and incubators are each assigned a unique identification. Each unit has one identifiable thermometer that is stored in the unit. The units temperature is monitored and documented on a daily basis. The following information is documented:

- thermometer identification
- refrigerator or freezer identification
- date and time
- temperature
- initials of person recording temperature
- expected temperature
- acceptance range

15.2.8. The conductivity of each deionized water unit is checked and documented daily. The conductivity shall be less than 2.0 uS @ 25°C. If the conductivity is greater than 2.0 uS @ 25°C, then the unit is labeled "unusable" and taken out of service until after the tank is changed by the supplier. The units also have a red light indicating that the conductivity is greater than 0.5 uS. If the red light is on, then the unit is labeled "unusable" and taken out of service until after the tank is changed by the supplier.
uS = micro Simens

15.2.9. If calibration and/or verification of performance for a given piece of equipment fails to meet any acceptance criterion, the item will be taken out of service. The equipment will be clearly identified as being "out of service," and if possible removed from the laboratory environment and stored in an assigned area until it has been repaired. The equipment will not be returned to use until calibration and/or verification demonstrates acceptable performance.

15.2.10. After determining that a piece of equipment has failed to meet a performance criterion, the laboratory will carefully examine the potential effect of this defect on previous calibrations and tests performed. If it is determined that previously reported data was affected, the Director of Quality Assurance and the Project Manager will be informed of the scope of the problem. The Director of Quality Assurance and the Project Manager will coordinate client notification and re-issuance of corrected Analytical Reports.

15.2.11. Equipment and instrumentation must consistently operate with in the specifications.

15.3. Standards & Reagents Tracking and Traceability

15.3.1. The degree of uncertainty in an analytical process is greater than or equal to the uncertainty in the applied standards. Chemical standards ordinarily are prepared by quantitatively combining constituents of known purity. The purity of the source of the material used for preparing the standards used for constructing the calibration curve standards and for preparing other quality control standards such as, matrix spikes and laboratory control standards, cannot be automatically assumed. Standards and reagents must meet the requirements of the test procedure.

15.3.2. Similarly, the stability of standards is also a prime requirement. If an expiration date is provided by the manufacturer it will be recorded and the standard will not be used beyond such date. If the expiration date is not provided , it is not required.

15.3.3. All standards and reagents will be purchased from reputable scientific or standard supply firms recognized by the environmental laboratory industry. All analytical reagents will be Analytical Reagent (AR) grade or better. Purchasing records, such as, purchase order and packing slips are retained.

15.3.4. Upon receipt, all standards and reagents will be labeled with the date of receipt, expiration date (if available), and the initials of the person responsible for un-packing and accepting the materials. Care will be taken to note any specific storage requirements such as refrigeration.

15.3.5. The analyst opening the reagent or standard is responsible for ensuring that the purity meets the requirements of the test. All standards and reagents will be labeled with the date opened at the time they are initially utilized.

15.3.6. All prepared standards and reagents will be labeled with the standard identification and concentration, solvent, date prepared, expiration date, initials of analyst, and applicable safety information. Detailed instructions for standard and reagent preparation are provided within the method SOPs and bench references.

15.3.7. All reference standards, purchased stock, purchased neat solutions, all intermediate solutions, and all working standards used more than one day, must be traceable to their source and method of preparation. Log books are kept documenting the preparation of standards from the "mother" source. Each reference, stock, intermediate and multiple use working standard is assigned a unique number and entered into the

appropriate Standards Tracking Log. This unique number should also be applied to the label.

15.3.8. All records received with standards such as Certificates of Analysis and Material Safety Data Sheets will be retained. All Certificates of Analysis will be labeled with the assigned standard number.

15.3.9. The assigned number for the source used to prepare the calibration curve, Initial Calibration Verification Standard (ICVS), Continuing Calibration Verification Standard (CCVS), Laboratory Control Standard (LCS), Matrix Spike (MS), Matrix Spike Duplicate (MSD), and surrogates must be referenced on the raw data.

15.3.10. Where available, the laboratory shall use calibration standards traceable to national standards. Evidence of correlation of results is obtained by participation in proficiency testing programs.

15.3.11. Where traceability to national standards of measurement is not available, the laboratory must provide satisfactory evidence of correlation of results by participation in a suitable program of interlaboratory comparisons, proficiency testing, or independent analysis.

15.4. Transport and Storage of Standards and Reagent and Materials

15.4.1. Standards, reagents, and materials are handled, transported, and stored in a way that protects their integrity.

15.4.2. Their integrity is protected by separation from incompatiable materials and by minimizing exposure to degrading environments.

15.4.3. Standards and reagents are stored according to manufacturer's recommendations and separately from samples.

15.5. Laboratory Supplies

15.5.1. Glassware is cleaned to meet the sensitivity of the method. Routine procedures are established and visibly posted.

15.5.2. Non-routine cleaning procedures unique to a specific method are documented in the method SOP and bench references used by the analyst.

15.5.3. Volumetric glassware used to prepare standards and reagents is ASTM class A.

15.6. References

SOP #101 titled, Balance Calibration
SOP #102 titled, Inorganic Calibration Curves
SOP #111 titled, Pipet Calibration
SOP #113 titled, Thermometer Calibration
SOP #114 titled, Organic Calibration Curves
SOP #118 titled, Measurement Traceability and Calibration,

16. Sample Preservation and Containers

16.1. Introduction

Generally, the client performs sampling. In the event that sampling services are provided by First Environmental Laboratories they are performed in accordance with procedures detailed in the following documents:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, Third Edition, September 1992 and it's updates.

"Handbook for Analytical Quality Control in Water and Wastewater Laboratories", EPA 600/4-79-019.

Special care is taken to ensure representative samples are obtained, and that cross contamination does not occur. Contamination is monitored through the use of trip blanks and field blanks.

16.2. Containers

To ensure that proper sample volumes are obtained, *First Environmental Laboratories, Inc.* provides our clients with clean, pre-labeled, pre-preserved sample containers. Sample containers, preservatives, and holding times are summarized in Table 6.1

16.3. Sample Splitting

General guidelines for splitting sample aliquots for analysis of aqueous and solid samples are available as a bench reference within the laboratory. In all cases, caution must be used during sampling splitting to prevent contamination or loss of analyte. It is also imperative that a representative portion of sample be obtained for analysis.

SAMPLE BOTTLE PRESERVATIVES AND HOLDING TIMES FOR AQUEOUS SAMPLES

METALS

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
General, dissolved	Plastic	Filtered on site, HNO_3 to pH<2	6 months
General, total	Plastic	HNO_3 to pH<2	6 months
Chromium, hexavalent	Plastic	Cool 4° C	24 hours
Mercury	Plastic	HNO_3 to pH<2	28 days

INORGANIC NON-METALS

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
Acidity	Plastic	Cool 4° C	14 days
Alkalinity	Plastic	Cool 4° C	14 days
Ammonia	Plastic	H_2SO_4 to pH<2, Cool 4° C	28 days
BOD	Plastic	Cool 4° C	48 hours
Bromide	Plastic	None	28 days
Chloride	Plastic	None	28 days
Chlorine	Plastic	Cool 4° C, Immediately	Analyze
Chromium, +6	Plastic	Cool 4° C	24 hours
COD	Plastic	H_2SO_4 to pH<2, Cool 4° C	28 days
Color	Plastic	Cool 4° C	48 hours
Conductivity	Plastic	Cool 4° C	28 days
Cyanide, Total or Amenable	Plastic	NaOH to pH>12, Cool 4° C	14 days
Cyanide, Reactive, pH 2	Plastic	NaOH to pH>12, Cool 4° C	14 days

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
Flash Point, Closed Cup	Glass	Cool 4° C	-
Fluoride	Plastic	None	28 days
Hardness, Total	Plastic	HNO_3 to pH<2	6 months
Nitrite	Plastic	Cool 4° C	48 hours
Nitrate/Nitrite (waste water, chlorinated drinking water)	Plastic	H_2SO_4 to pH<2, Cool 4° C	28 days
Nitrate/Nitrite (non-chlorinated drinking water)	Plastic	H_2SO_4 to pH<2, Cool 4° C	14 days
Nitrate/Nitrite (non-chlorinated drinking water)	Plastic	Cool 4° C	48 hours
Nitrate/Nitrite (chlorinated drinking water)	Plastic	Cool 4° C	28 days
Oil & Grease	Glass	H_2SO_4 to pH<2, Cool 4° C	28 days
pH	Plastic	None	Analyze, Immediately
Phenols	Glass	H_2SO_4 to pH<2, Cool 4° C	28 days
Phosphorus, Ortho	Plastic	Cool 4° C	48 hours
Phosphorus, Total	Plastic	H_2SO_4 to pH<2, Cool 4° C	28 days
Silica	Plastic	Cool 4° C	28 days
Solids, Dissolved	Plastic	Cool 4° C	7 days
Solids, Suspended	Plastic	Cool 4° C	7 days
Solids, Total	Plastic	Cool 4° C	7 days
Solids, Settleable	Plastic	Cool 4° C	48 hours
Solids, Volatile	Plastic	Cool 4° C	7 days
Sulfate	Plastic	Cool 4° C	28 days
Sulfide	Plastic	ZnOAc + NaOH to	7 days

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
		pH>9 Cool 4° C	
Sulfide, Reactive pH 2	Plastic	ZnOAc + NaOH to pH>9 Cool 4° C	7 days
Sulfite	Plastic	None	Analyze Immediately
Surfactants, MBAS	Plastic	Cool 4° C	48 hours
Turbidity	Plastic	Cool 4° C	48 hours

ORGANIC PARAMETERS

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
HPLC Pesticides (Aldicarb / Carbonfuran)	Glass vial	Cool 4° C	28 Days
EDB/DBCP	Glass vial	Cool 4° C	28 Days
Endothall	Glass	Cool 4° C	7 days extraction 1 day - analysis
Pesticides and PCBs	Glass	Unpreserved $Na_2S_2O_3$ if Cl_2 is present, Cool 4° C	7 days extraction 40 days - analysis
PCBs (only)	Glass	Unpreserved Cool 4° C	None
Petroleum Hydrocarbons, IR	Glass	H_2SO_4 to pH<2, Cool 4° C	28 days
Phenoxyacid Herbicides	Glass	Unpreserved $Na_2S_2O_3$ if Cl_2 is present, Cool 4° C	7 days extraction 40 days - analysis
Phthalate Esters	Glass	Unpreserved $Na_2S_2O_3$ if Cl_2 is present, Cool 4° C	7 days extraction 40 days - analysis

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
Polynuclear Aromatic Hydrocarbons	Glass	Unpreserved $Na_2S_2O_3$ if Cl_2 is present, Cool 4° C	7 days extraction 40 days analysis
GC/MS Semivolatiles	Glass	Unpreserved $Na_2S_2O_3$ if Cl_2 is present, Cool 4° C	7 days extraction 40 days analysis
Total Organic Carbon (TOC)	Plastic	H_2SO_4 to pH<2, Cool 4° C	28 days
Total Organic Halogens (TOX)	Glass	H_2SO_4 to pH<2, Cool 4° C $Na_2S_2O_3$ if Cl_2 is present	28 days
Total Petroleum Hydrocarbons	Glass	Cool 4° C	7 days extraction 40 days - analysis
Volatile Organics	Glass vial	HCl to pH<2 Cool 4° C $Na_2S_2O_3$ if Cl_2 is present,	14 days
Volatile Aromatic Organics	Glass vial	$Na_2S_2O_3$ if Cl_2 is present, HCl to pH<2	14 days

16.3. References

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, Third Edition, September 1992 and it's updates.

"Handbook for Analytical Quality Control in Water and Wastewater Laboratories", EPA 600/4-79-019.

40 CFR Part 122, 136, et al., "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act; National Primary Drinking Water Regulations; and National Secondary Drinking Water Regulations; Analysis and Sampling Procedures; Final Rule," March 12, 2007.

17. Sample Acceptance, Log-in, Storage, Disposal, and Tracking

17.1. Sample Acceptance Policy

Certification requires the laboratory to establish a written acceptance policy that clearly outlines the circumstances under which samples will be accepted. This policy must be made available to all sample collection personnel. A copy of the laboratories' sample acceptance policy is included in First Environmental Laboratories' Service Brochure that is provided to new clients. A copy of the policy will be included along with the chain of custody forms and sample instructions provided with sample bottles. Clients are encouraged to use sampling materials provided by the laboratory.

17.2. Chain of Custody Procedures

17.2.1. Chain of Custody Record

An essential part of any sampling or analytical event is assuring the integrity of the sample from collection to data reporting. The chain of custody provides documentation and traceability of sample possession and handling. Samples are physical evidence and should be handled according to the procedural safeguards outlined in the SOP titled, Sample Acceptance Policy, Receipt, Log-in and Storage, (#119). Any analytical data can potentially be used for purposes of litigation and strict adherence to chain of custody procedures is necessary. Evidentiary chain of custody procedures, which may be required for specific projects at the request of the client, are provided in the SOP titled, Evidentiary Chain of Custody Procedures, (SOP #116).

The chain of custody record contains the following information:

- company's name, address, and phone number, and facsimile number
- contact name
- sampler or collector's name
- project identity / location
- identity of person receiving report
- date / time of sample collection
- sample identification, description, or location
- matrix type
- analyses required or reference to quote/order detailing required analyses
- condition of sample shipper and containers upon receipt
- preservation type
- temperature of cooler upon receipt
- date and time of sample receipt
- signatures of persons involved in the chain of possession
- comments / special instructions

- lab identity (a unique laboratory sample number entered by laboratory personnel)

17.2.2. Initiation of the Chain of Custody (COC)

17.2.2.1. Chain of custody forms will be provided with all sample containers.

17.2.2.2. The chain of custody is initiated in the field by sample collection personnel. The sample collector is responsible for the care and custody of the samples until properly dispatched to the receiving laboratory or turned over to the laboratory. The sample collector must assure that each container is in his/her physical possession or view at all times, or locked in such a place and manner to preclude tampering.

17.2.2.3. If samples are received but the chain of custody is lacking, the person delivering the samples will fill out a chain of custody form. If a third party courier without a COC delivers the samples, the client will be notified immediately. A faxed, signed form from the client is sufficient to allow receipt and analysis by the lab. Clients should be encouraged to use the proper procedures and forms.

17.2.2.4. Deviation from acceptable protocols will be cited in the Analytical Report.

17.2.3. Maintaining Chain-of-Custody

17.2.3.1. Samples awaiting analysis are refrigerated if necessary.

17.2.3.2. If a sample needs to be shipped to a subcontracted laboratory, a purchase order/ chain of custody form will be completed. Pertinent information regarding sample analysis particular to the project such as, method and detection limit requirements will be provided to the subcontracting laboratory. The client must be informed regarding analyses performed externally.

17.2.3.3. In order to satisfy the custodial and evidentiary requirements of sample handling procedures, the following will be adhered to at all times:

- Samples will be stored in a secure area

- Access to the laboratory will be through a monitored reception area. Other access doors to the laboratory will be kept locked.

- Visitors are escorted while in the laboratory. All visitors sign the "Visitor Log."

- After a sample has been removed from storage by the analyst, the analyst is responsible for the custody of the sample. Each analyst should return the sample to the storage area before the end of the working day.

17.2.3.4. The chain of custody record is used to document return of samples to clients.

17.3. Sample Receipt by Laboratory

17.3.1. Laboratory custody of the sample begins at sample receipt. Samples may be delivered by the following methods:

- Field samplers provided by *First Environmental Laboratories, Inc.*
- Field samplers provided by the client
- *First Environmental Laboratories, Inc.* couriers
- Private courier service
- US mail
- The client or an agent of the client.

17.3.2. Independent couriers are not required to sign the chain of custody form. Ideally, the chain of custody should be kept in the sealed sample cooler. The receipt from the courier or the transportation bill should be kept with the chain of custody record retained by the laboratory. Normally, samples will be received by the office manager or Project Manager. The employee receiving the samples is responsible for signing the delivery forms for the carrier. The shipping containers are then taken to the log-in area for completion of the receiving process, which entails unpacking the shipping container and cross checking the chain of custody against the quote/order on file for the project.

17.3.3. Samples received after normal working hours or on weekends, which are not immediately unpacked, will be placed in cold storage.

17.4. Sample Log-in

17.4.1. Thermal Preservation

Samples are examined for proper thermal preservation.

17.4.2. Chemical Preservation and Sample Volume / Damage Inspection

17.4.2.1. Samples are examined for proper containers having appropriate chemical preservation and adequate sample volumes upon receipt. If necessary, a representative portion of sample is split into appropriately preserved containers. The person performing the task documents the action taken and indicates their initials and the date.

17.4.2.2. Samples are visually inspected for damage and indications of potential contamination.

17.4.3. Holding Times

17.4.3.1. Analyses having "short" holding times, must be delivered to the laboratory in a manner that provides adequate lead time to meet the holding time.

17.4.3.2. Log-in personnel will notify laboratory personnel when samples are received requiring analyses that are known to have "short" holding times.

17.4.4. Verification

The sample container identification is compared to the chain of custody and the chain of custody is in turn compared to the quote/order. Any discrepancies found are noted and the Project Manager notified. If discrepancies are found, the client will be contacted for clarification.

17.4.5. Laboratory Identification

17.4.5.1. A unique five digit code is assigned to each sample which is the batch I.D.. A three digit number follows the batch ID indicating the sample within the batch. A two digit number and alpha letter designates the bottle type, i.e., 4 oz jar. (Example: 6-0532-001-01C). Container associations are pre-determined within the test groups built in the LIMS. The laboratory sample ID is written on the chain of custody record in the column labeled, "Lab I.D." The laboratory Bottle labels are printed and placed on the appropriate bottles.:

17.4.5.2. Each container is assigned a unique Lab I.D. code. A durable label and indelible ink are used to ensure sample labeling integrity.

17.4.5.3. The Lab I.D. code is used to identify all samples, subsamples, extracts and digests. The Lab I.D. code/container code is entered into the laboratory records and is used to link the sample with all activities related to sample analysis.

17.4.5.4. At the end of each day a Login Report is printed. The title of the report is, "Login Report – Samples Logged In: XX/XX/XX (date). This report summarizes the lab number (or Lab I.D.), Client Name, Project I.D., Sample Description, Type, Received Date/Time, Due Date, and Initials (of person making entries) are entered in the sample logbook in numerical order. The sample logbook provides a link between each client sample description and the assigned Lab I.D. code.

17.4.6. Documentation

17.4.6.1. The form titled, Sample Acceptance & Log-in Record, is completed during log-in. (See Page 11 of this SOP.) This form is used to document failures to meet sample acceptance criteria. The form is retained in the project file. A copy of the laboratories'

sample acceptance policy is included with the chain of custody forms and sample instructions provided with sample bottles. (See Page 12 of this SOP) If sample acceptance criteria have not been met, decisions to proceed with analysis will be documented. Clients having patterns of failure to comply with sample acceptance criteria will be contacted and notified verbally of the observed problems. A corrective action form will be filed to document the effort made by the laboratory to correct the problem. If the situation does not improve and a pattern of failure to comply with sample acceptance criteria remains, the Director of Quality Assurance will send written notification and seek written acknowledgment from the client.

17.4.6.2. A project file folder is prepared for each sample group submission. The tab of the project file is labeled with the client name, sample number(s), and due date. If the sample(s) require RUSH analysis, the tab is also stamped "RUSH." The sample acceptance form is included in the project file. It is preprinted to allow entry of the due date, Project Manager I.D., checkboxes for analyte groups, reviewed by, date reported, date faxed, date invoiced.

17.4.6.3. The chain of custody form, accompanying freight bills, quote/order form and log sheets are placed in the project file, which is then forwarded to the Analysis Control Area.

17.4.6.4. The assigned Project Manager reviews the project within 24 hours of log-in completion. The Project Manager initials the file folder upon completing the review.

17.4.6.5. Whenever there is a problem or question associated with sample acceptance, the Project Manager will be notified. The Project Manager is responsible for resolving the problem, documenting resolution of the problem and documenting the decision to proceed with analysis. Depending on the nature of the issue, problem resolution will be documented on either the COC, Sample Acceptance & Log-in Record or on a Phone Log.

17.4.6.6. The COC is part of the final report delivered to the client. Where appropriate the Project Manager will cite deviations from acceptable protocols and qualify analytical data in the final Analytical Report.

17.4.6.7. If samples do not meet acceptance criteria and samples are ultimately rejected, all correspondence and records of conversations concerning the final disposition of rejected samples will be retained.

Note: At some point in the future, the COC form may be revised to include the statements listed on the Sample Acceptance & Log-in Record negating the need to utilize this separate form. This form could continue to be utilized as a phone log when necessary.

17.5. Sample Storage

17.5.1. Samples must be stored in a manner that avoids deterioration, contamination, or damage during storage, handling, preparation, and analysis.

17.5.2. Samples are stored away from all standards, reagents, food and other potentially contaminating sources. Highly contaminated samples must be segregated from other "clean" samples to prevent cross contamination.

17.5.3. Sample extracts, leachates and digests are stored in an area separate from samples.

17.5.4. Samples are stored in accordance with the thermal preservation requirements established in the methods.

17.5.5. The refrigerators used for sample storage are monitored on a daily basis. The temperature of each unit is maintained within $\pm 2^{\circ}C$ of the specified preservation temperature unless method specific criteria exist. For samples with a specified storage temperature of $4^{\circ}C$, the temperature is maintained between the freezing point of water to $6^{\circ}C$.

17.5.6. Samples requiring evidentiary chain of custody procedures will be stored in a refrigeration unit that can be secured.

17.5.7. When obtaining a sample aliquot from a submitted sample, laboratory personnel will ensure that the sample is homogenous prior to taking the sample aliquot.

17.6. Sample Disposal

17.6.1. General

Thirty days after completion of the final report, samples will be disposed in an appropriate manner.

17.6.2. Hazardous

17.6.2.1. If a sample is determined to be hazardous during the course of analysis the Project Manager and other analysts are notified. A notation is made on the file folder indicating the hazardous constituent and it's concentration. The sample is flagged with a piece of red tape. The identity and concentration of the hazardous constituent is noted on the red tape. The red tape is used to segregate that sample at the time of routine disposal. When the sample is segregated from other samples for appropriate disposal, it is entered into the "Log for Hazardous Samples Awaiting Disposal." The log details the sample ID,

date of storage, physical description, quantity, hazard concentration, method of disposal, and date of final disposal.

17.6.2.2. An attempt is made to return hazardous samples to the originating source. If the sample cannot be returned to the client, then the sample is stored until appropriate disposal arrangements are made.

17.7. Measurement, Calibration, Sample and Data Tracking

17.7.1. The ability to track samples and to link the raw data and final reports unequivocally to the sample is necessary. Also, in the event that the data is used in litigation, the laboratory must be able to recreate the analytical scenario. The procedures and practices routinely used by the laboratory are documented in the Quality Assurance Program Plan (QAPP) and in the SOPs to ensure that the data is accurate and complete, of consistently high quality, and is legally defensible.

17.7.2. Tracking samples and information pertaining to the analysis of a specific sample is performed in either of two ways:

17.7.3. Information can be tracked using the unique 8 digit code assigned to the sample upon receipt. This code is added to the chain of custody by laboratory personnel in the column labeled "Lab I.D." Examples of the types of information that can be tracked using this code are raw data, report, and/or invoice.

17.7.4. Information can also be tracked using the date of sample receipt, extraction, or analysis.

17.8. References

SOP #119 titled, "Sample Acceptance Policy, Receipt, Log-in and Storage"

SOP #116 titled, "Evidentiary Chain of Custody" (#116)

SOP #123 titled, "Sampling Instructions & Materials"

Attachment 5: Chain of Custody Record

Sampling Instructions

- The sampling containers provided to you may contain small amounts of required preservative. The preservatives in common use are: 1 + 1 sulfuric acid, 1 + 2.5 nitric acid, 1 + 1 hydrochloric acid, and sodium hydroxide pellets. These preservatives are strong acids and bases, and can cause burns. Use caution at all times. Material Safety Data Sheets are available upon request. Information can also be obtained form Chemtrec @ 800-424-9300.
  (Note: 1 + 2.5 translates to 1 part acid to 2.5 parts deionized water).

- Do not rinse the sample containers prior to use.

- Fill plastic and glass containers to approximately one inch from the top and cap tightly.

- Aqueous Samples Requiring Volatile Analysis: Fill volatile vials full (reverse meniscus) and carefully slide the septum onto the vial. Screw on the cap and check the vial for air bubbles. A properly filled vial will contain no air bubbles.

- Soil Samples: 4 oz. jars are used for the collection of soil samples. Special procedures and sampling materials are required for the collection of volatile samples.

- The temperature within the cooler must be maintained at 4°C during transit to the laboratory. Please ensure that appropriate quantities of ice are enclosed within the cooler to maintain this temperature.

- Please complete the enclosed chain of custody. This is an integral component of documentation supporting any analysis performed for regulatory compliance.

- If required, seal the cooler with a custody seal. The custody seal demonstrates to laboratory personnel the maintenance of sample integrity during sample transportation to the laboratory.

- Although each sampling event is unique, remember to get as representative of a sample as possible. This might mean running the water for two minutes; mixing the sample prior to filling the containers; etc.

If you have any questions, please feel free to contact the lab at (630) 778-1200 or consult our website at www.firstenv.com.

Sampling Instructions for QC Containers

In some cases, the laboratory needs additional sample volume in order to meet method QC requirements for the analysis of Matrix Spike (MS) and Matrix Spike Duplicate (MSD).

Extra bottles for MS and MSD are sent for certain bottle types whenever requests for 5 or more sample kits are received.

A colored label on the extra bottles identifies that they are included for QC purposes. It states:

"Needed for internal Lab QC purposes.
Fill all bottles from one sampling location.
Identify sampling location.
Do not enter on COC."

The bottles that need to be filled are placed in a colored plastic bag. Vials are place in a bubble bag. The bag will have a twist tie closure / tag or label that specifies the containers are needed for QC purposes.

Extra bottles are provided for the following containers:
1 L amber NT - 2 QC bottles
O &G – 2 QC bottles
VOA water samples – 3 QC vials
VOA soil samples Method 5035 – 2 sodium bisulfate preserved vials
VOA soil samples Method 5035 frozen – 2 vials w. stir bars

As an example:

You requested 15 – 5035 Sample Kits. Your cooler will contain 15-5035 kits and 2 sodium bisulfate preserved vials with a yellow label indicating that they are for internal Lab QC purposes. The vials will be in a bubble bag. Please fill the vials from one of the sampling locations and identify the location on the vial label. Do not enter these extra vials separately on the COC.

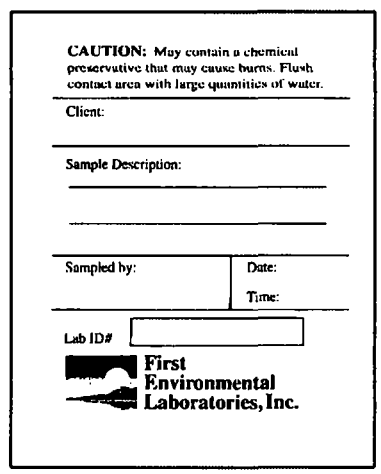
The regulations guiding laboratory certification requires that our laboratory have a written sample acceptance policy available to sample collectors. Exceptions to the items below will be noted on the chain of custody and in the analytical report.

The sample collector must document the following information on the Chain of Custody:

- Your company's name, address, phone, fax number and e-mail address.
- Identity of person that will receive the report.
- Sampler or collector's name.
- Project identity or location.
- Date and time of sample collection.
- Sample identification, description, or location and matrix type.
- Analyses required or reference to quote or order detailing required analyses.
- Signatures of persons involved in the chain of possession including the collector's.
- Comments or special instructions

Laboratory personnel must document the following on the Chain of Custody or Sample Login and Acceptance form:

- Completeness of the documentation provided by the client (above list).
- Condition of sample shipper and containers upon receipt.
- Preservation type.
- Temperature of cooler upon receipt.
- Date and time of sample receipt.
- Signatures of persons involved in the chain of possession, including receiving personnel.
- Lab sample ID number.



Sample bottles provided by the laboratory are pre-labeled with water resistant labels that are color coded to indicate the type of preservative present in the container.

Dark Blue = Hydrochloric Acid
Red = Nitric Acid
Yellow = Sulfuric Acid
Light Blue = Sodium Hydroxide
Teal = No Treat (No preservative)

Sample bottles need to be labeled using indelible ink. Adequate sample volume must be provided for the analyses requested.

The temperature within the cooler must be maintained at 4°C during transit to the laboratory. Please ensure that appropriate quantities of ice or ice packs are enclosed within the cooler to maintain this temperature.

Analyses having "short" holding times, must be delivered to the laboratory in a manner that provides adequate lead time to meet the holding time.

More information regarding sample volume, preservation, and holding time requirements can be found on our website at *www.firstenv.com* or by contacting us by phone at 630-778-1200.

Sample Acceptance & Login Record

Client Name:	Batch No:	Due Date:

Indicate the number of samples by matrix:

Soils/Sed/Sludge:	Aqueous:	Other:

Indicate the number of containers received per sample:

4 oz WMG		**NaOH (p) CN**		**40mL VOC Vials**	
16 oz WMG		**No Treat (g) Amber/Clear**		**Trip Blank**	
32 oz WMG		**H_2SO_4 (p) WC**		**H_2SO_4 (p) WC Diss**	
5035 Kit Na_2SO_4		**HNO_3 (p) Metals**		**HNO_3 (p) Metals Diss**	
5035 Kit Frozen		**No Treat (p)**		**No Treat (p) Dissolved**	
Other:		**H_2SO_4 (g) Phenol**		**ClAc Vials**	
		HCl or H_2SO_4 (g) O&G		**EDB Vials (NT)**	
Samples on Hold:		**H_2SO_4 (p) TOX**		**Endo**	
Location:		**ZnAc (p)**		**Sterile Bac-T**	

Collector's name present on the COC?	yes no n/a	**Sample preservation requirements met?**	yes no n/a
Client project ID present on the COC?	yes no n/a	**Cooler Temperature:**	_____
Samples clearly identified / match info on the COC?	yes no n/a	**Thermal preservation requirements met?**	yes no n/a
Date and time of collection indicated?	yes no n/a	**Samples arrived within holding times?**	yes no n/a
Containers intact and undamaged?	yes no n/a	***Samples requiring filtration or preservation should be processed as soon as possible.***	

If necessary, provide details and document resolution of problem(s) below. Indicate who was contacted, when they were contacted and by whom, and what decisions were made. Initial and date each entry.

Date:_____ ***Client Contact:***_____

Authorization to proceed: Yes No

Comments/Resolution:_____

_____

Logged in By:	Project Manager:

Final Report:

Reviewed By: **2nd Review By:**	**QC Pkg Required:**
Date E-mailed:	**Batch Full Other**
PDF DATA file Results file Other EDD Invoice	
Date Faxed:	**Date Reviewed:**
Date Invoiced: **PO#**	**Initials:**
Quote Enclosed: **Surcharge:_____%**	

Notes:_____

_____

First Environmental Laboratories, Inc.

CHAIN OF CUSTODY RECORD

Page___ of ___ pgs

First Environmental Laboratories
1600 Shore Road, Suite D
Naperville, Illinois 60563
Phone: (630) 778-1200 • Fax: (630) 778-1233
E-mail: firstinfo@firstenv.com
IEPA Certification #100292

Company Name: _____

Street Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____ e-mail: _____

Send Report To: _____ Via: Fax ☐ e-mail ☐

Sampled By: _____

Project I.D.: _____

P.O. #.: _____

Matrix Codes: S = Soil W = Water O = Other

Analyses

Date/Time Taken	Sample Description	Matrix										Comments	Lab I.D.

FOR LAB USE ONLY:

Cooler Temperature: 0.1-6°C Yes__ No.__ _____°C
Received within 6 hrs. of collection:_____
Ice Present: Yes__ No__

Sample Refrigerated: Yes__ No__
Refrigerator Temperature:_____°C.
5035 Vials Frozen: Yes__ No__
Freezer Temperature:_____°C

Containers Received Preserved: ☐ Yes ☐ No

Notes and Special Instructions: _____

Relinquished By: _____ Date/Time _____ Received By: _____ Date/Time _____

Relinquished By: _____ Date/Time _____ Received By: _____ Date/Time _____

Rev. 4/04

18. Assuring the Quality of Environmental Test and Calibration Records

18.1. Introduction

18.1.1. Our objective is to provide our clients with data that is of known and documented quality that is legally defensible in a court of law.

Various checks are implemented to ensure the quality of the test. Statistical control charting is used to detect trends. Reference materials are used to verify calibration and training. Routine participation in a PT program per field of testing is used to monitor overall performance of the test. Replicate and retesting using various techniques is also used to verify test performance.

18.1.2. Quality control procedures can be broken down into three main categories: Instrumentation, Methods, and Samples. Tables A-C list the various quality control indicators frequently used by *First Environmental Laboratories, Inc.* Each method SOP will give the details concerning the quality control indicators and acceptable criteria.

Instrument Quality Control

Table A

Linear Range Analysis
Demonstration of Capability
Limit of Detection
Multi-Point Initial Calibration
Initial Calibration Verification Standard
Initial Calibration Blank
Continuing Calibration Verification Standard
Continuing Calibration Blank
Interference Check Standard (ICP Analysis)
System Tuning (GC/MS Analysis)
Internal Standard Response (Gas Chromatography)

Method Quality Control

Table B

Method Blanks
Lab Control Standard

Sample Quality Control

Table C

Surrogate or System Monitoring Compounds (Organic Analyses)
Matrix Spike/Matrix Spike Duplicate
Duplicates

18.2. Essential Quality Control Procedures

18.2.1. The purpose of a Quality Assurance Program is to verify that the data produced is technically sound, legally defensible and of consistently high quality. The data produced will be of known accuracy, precision, completeness, representativeness, and comparability. These objectives are measured by various internal quality control checks performed during the course of analysis. Each individual method will dictate which Quality Control Indicators (QCI) will be analyzed, at what frequency, and will specify the acceptance criteria. If an acceptance criterion is not met for a particular QCI, the analysis is halted and corrective action is taken. If necessary, samples are re-prepared or re-analyzed. When appropriate, data is flagged and a detailed explanation qualifying the data is provided in the case narrative submitted with the Analytical Report.

Method requirements supercede generic guidance provided in non-method documents such as this Quality Assurance Manual, the NELAC Standard, or non-method SOPs developed for training purposes.

18.2.2. Generally, the QCIs can be categorized as being instrument, method, or matrix specific. The following provides definitions of the various QCIs used to ensure that the highest level of data quality is produced consistently.

18.2.3. The specific method and training SOPs contain greater detail regarding frequency, acceptance criteria, initial corrective action, final action, and data qualification and take precedence over the general guidance provided in this document. These SOPs also provide formulae for calculating percent recovery, relative percent difference, regression equations, and statistical acceptance criteria.

18.3. Initial Validation

18.3.1. Prior to using an instrument or method for performing sample analysis, initial validation is performed to characterize the upper and lower range of operation, and to demonstrate precision and accuracy of the analysis.

Addition of an analyte to a previously validated method will require an initial demonstration of capability for that analyte.

18.3.2. Linear Range Analysis: A standard or series of standards analyzed to demonstrate the highest concentration at which the instrument shows acceptable performance.

18.3.3. Method Detection Limit (MDL) Study: Replicate (7 or more) analysis of spiked samples to statistically determine the lowest concentration that can be determined using the method.

Determination of the MDL requires that the test sample aliquot be processed through all stages of sample preparation normally associated with the analysis, i.e., digestion, distillation, and extraction.

18.3.4. The source for the DOC standard is either a quality control (QC) check sample obtained from an appropriate source, such as ERA, APG, or USEPA, or a standard prepared using a standard source that is different from that used in instrument calibration. The concentration of the DOC will ideally be 5-50 times the MDL or 1-4 times the Limit of Quantification (i.e., reporting limit). Four aliquots of standard are analyzed according to the method. The standards are processed through the entire analytical procedure, including sample preparation. Concurrent analysis is <u>not</u> required. Calculate the mean value, mean percent recovery, standard deviation of replicates, and percent relative standard deviation of replicates for each analyte. Compare percent relative standard deviation and average recovery to the corresponding acceptance criteria for precision and accuracy in the approved test method. If information is not available, refer to Table 1020 I in the 20th Edition of Standard Methods.

Analysis cannot begin until all acceptance criteria are met. If any one of the parameters do not meet acceptance criteria, the performance is unacceptable for that analyte. The source of error must be determined and the demonstration of capability repeated for the analytes of interest.

18.3.5. Performance Samples / Reference Standards: External standards obtained from agencies or independent firms that supply environmental quality control standards. The standard contains an unknown amount of target analyte(s), and may contain an unknown identity of target analyte(s). These performance or reference standards provide an independent check of the analytical and reporting procedures used by the laboratory.

18.4. Instrument Specific Quality Control Indicators

18.4.1. System Tuning (GC/MS analyses): The electronics of a GC/MS are adjusted so that a mass spectrum of PFTBA meets predetermined abundances. The tune is further checked by analyzing 4-BFB (Volatiles) or DFTPP (Semi-volatiles) which must meet standard abundances.

If the tune is unacceptable, then all associated data is unusable and the samples must be re-analyzed.

18.4.2. Multi-Point Initial Calibration: A plot of concentrations of known analyte standards verses the instrument response to the analyte. Calibration standards are prepared by successively diluting a standard solution to produce standards that cover the working range of the instrument.

18.4.3. Initial Calibration Verification Standard (ICVS): A standard from a source different from that used to prepare the multi-point calibration(s) used to verify that the material was of sufficient purity, and that the multi-point calibration was properly prepared.

The ICVS must be within acceptance criteria for the multi-point curve to be deemed acceptable.

18.4.4. Reporting Limit Verification Standard (RLVS): A standard at the reporting limit which is analyzed after the curve to vefiry the reporting limit. This standard is only analyzed when the lowest standard in the calibration curve is greater than the reporting limit.

The RLVS should be withing +/- 30% of the true value.

18.4.5. Continuing Calibration Verification Standard (CCVS): A mid-level standard which is analyzed at the beginning of each analytical batch and periodically during the course of analysis to verify the initial calibration.

If the CCVS fails, data for all samples analyzed after the failed CCVS is unusable and the samples must be re-analyzed after appropriate corrective action has been taken.

18.4.6. Continuing Calibration Blank or Reagent Blank: A blank which is analyzed at the beginning of each analytical batch and periodically during the course of analysis to verify that the instrument baseline is zero and that the instrument is free of contamination. This QCI is used primarily for metals and conventionals analyses.

The analyte concentration in the blank will be less than the reporting limit unless the method contains an exception. Positive blank values greater than the reporting limit are reported as an out of control condition and, if appropriate, the data is flagged. Corrective action will be initiated prior to resuming sample analysis.

18.4.7. Interference Check Standard: A standard that contains interfering elements at high concentrations and other non-interfering elements at trace concentrations to prove that the background correction intervals and inter-element correction factors have been set properly. This QCI is used only for ICP analysis.

If the interference check standard analysis is not within control, then the background correction points or the inter-element correction factors are incorrect and the accompanying sample data is not usable. After correcting the background correction points and interference correction factors, the samples must be re-analyzed.

18.4.8. Internal Standard: A spike added to each sample prior to performing an organic analysis that is used to perform analyte quantitation. The internal standard is also used to verify instrument response and retention time stability.

18.5. Method Specific Quality Control Indicators

18.5.1. Method Blanks: An analyte free matrix, such as de-ionized water, which is carried through the complete sample preparation and analytical procedures. The method blank is used to document that the procedures are free of contamination sources.

The analyte concentration in the procedure blank should be less than the reporting limit unless the method contains an exception, e.g., phthalates found in GC/MS semi-volatile analyses. Generally, procedure blanks are not subtracted unless permitted by the method. Positive blank values greater than the reporting limit are reported as an out of control condition and, if appropriate, the data is flagged. Corrective action will be initiated prior to resuming sample analysis.

18.5.2. Lab Control Standard (LCS): A spiked aliquot of analyte free matrix, such as de-ionized water, which is carried through the complete sample preparation and analytical procedures. The lab control standard is used to demonstrate that analyte is not lost during the course of sample preparation and analysis.

If the LCS is not within acceptance limits, the sample batch must be re-prepared and re-analyzed. If there is insufficient sample available for re-analysis, the out of control condition is noted and, if appropriate, the data is flagged.

18.5.3. Performance Samples / Reference Standards: External standards obtained from agencies or independent firms that supply environmental quality control standards. The standard contains an unknown amount of target analyte(s), and may contain an unknown

identity of target analyte(s). These performance or reference standards provide an independent check of the sample preparation and analytical procedures.

Failure to pass a performance sample initiates the corrective action process.

18.6. Sample Specific Quality Control Indicators

18.6.1. Surrogate or System Monitoring Compounds: An organic compound which is similar to the target analytes in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. The compound(s) are added to each sample prior to sample preparation or analysis to determine matrix effects and analyte recovery after sample analysis.

If the percent recovery for the surrogate(s) is not within acceptance limits, the sample will be re-extracted and re-analyzed. If this is not possible, the out of control condition is noted and, if appropriate, the data is flagged.

18.6.2. Matrix Spikes / Matrix Spike Duplicates (MS/MSD): Duplicate aliquots of sample spiked with a known concentration of target analytes. The spiking occurs prior to sample preparation and analysis. A matrix spike is used to determine the bias of a sample.

If the MS/MSD data is outside acceptance limits, the results for the LCS are checked. If the LCS is in control, the procedure is in control and the data may be reported with a flag identifying the outlier spike data. Potentially, there may be a matrix interference which adversely affected the analytical results. The Method of Standard Additions (MSA) may be used for quantification of metals analytes.

18.6.3. Duplicate: A second analysis that is performed on a sample to determine the precision of the analytical method in a given sample matrix.

If the relative percent difference is not within the acceptance limits, the sample will be reanalyzed. This may indicate that a non-homogenous sample aliquot was obtained for the initial analysis.

18.7. Specific Routine Procedures to Assess Data Precision, Accuracy and Completeness

18.7.1. Accuracy

Accuracy is a measurement of agreement between an observed value and a true (theoretical) value. Several of the above QCIs measure accuracy including; Initial Calibration, Continuing Calibration, Laboratory Control Standard, and Matrix Spikes.

18.7.2. Precision

Precision is a measurement of reproducibility in duplicate and replicate analyses. The relative percent difference (RPD) between duplicate analyses is a measurement of the precision of a given analysis.

18.7.3. Limit of Detection (LOD)

The LOD is an estimate of the minimum amount of a substance that an analytical process can reliably detect. The laboratory utilizes test methods that provide a detection limit that is appropriate and relevant for the intended use of the data.

An LOD is analyte and matrix specific, and is laboratory dependent. The LOD is initially determined for the compounds of interest in each test method in a quality system matrix of interest. The LOD includes all sample processing steps of the analytical method.

A LOD study is not required for any component for which spiking solutions or quality control samples are not available such as temperature. OR when test results are not to be reported to the LOD. Where an LOD study is not performed, the lab may not report a value below the limit of quanitation.

LODs are determined each time there is a change in the test method that affects how the test is performed, or when a change in instrumentation occurs that affects the sensitivity of the analysis. The LOD is verified annually for each method, analyte, and matrix except if the following applies: the lowest calibration standard is equal to or below the reporting limit, or the reporting limit is verified by analyzing a standard at the reporting limit each time the analysis is performed.

The Limit of Quantitation (LOQ) is the minimum levels, concentrations, or quantities of an analyte that can be reported with a specified degree of confidence. The LOQ frequently equals the low calibration standard or is approximately 10 times the standard deviation from replicate measurements. In either case, the method LOQ is above the LOD.

If the annual review of the LOD indicates a change to the historic data base, the LOQ will be re-evaluated.

Unless specified otherwise by the method, a method detection limit study is used to determine the LOD. If an MDL is not appropriate, the procedure used to determine LOD will reflect instrument limitations and the intended application of the test method. The MDL is the minimum concentration of a substance that can be measured and

reported with 99% confidence that the analyte concentration is greater than zero. It is determined from analysis of a sample in a given matrix containing the analyte.
All procedures used for determining the LOD or MDL must be documented. Documentation must include the quality system matrix type. All supporting data must be retained

18.7.4. Standards & Reagents

All standards and reagents will be purchased from reputable scientific or standard supply firms recognized by the environmental laboratory industry. All analytical reagents will be Analytical Reagent (AR) grade or better.

18.7.5. Selectivity & Sensitivity

The method used for analysis must be appropriately selective and sensitive to meet data quality objectives established by the client.

18.7.6. Test Conditions

Environmental and instrumental test conditions are controlled to the meet the needs to the test.

18.7.7. Completeness

The measure of the amount of valid data obtained from the analytical measurement system compared to the amount that was expected to be obtained under optimal conditions.

Control criteria for each quality control indicator either meet or exceed EPA method requirements. Analyte specific criteria are summarized in the SOP for a given analyte.

18.7.8. Comparability

The confidence with which one data set can be compared to another.

18.7.9. Representativeness

The degree to which the data accurately and precisely represent a characteristic of a population parameter, variation of a property, a process characteristic, or an operational condition.

18.7.10. Correlation of Results

Data is reviewed for correlation of results and chemical relationships. A list of most common relationships follows:

Conductivity and TDS
TDS= 0.65 x Conductivity
COD, BOD, TOC
COD>BOD
BOD>TOC
COD>TOC
Hardness and Ca/Mg
Hardness as Ca Co3 (mg/L) = 2.497 Ca + 4.118 Mg
Solids
TS = TSS + TDS
TSS = TS – TDS
TDS = TS-TSS
Chromium, total
Cr total = (Cr III) + (Cr VI)
Total Kjeldahl N = (Org Nitrogen) + (Ammonium Nitrogen)
Total Concentration = or ≥ Dissolved Concentration

18.7.11. Uncertainty of Measurement

The total uncertainty of measurement needs to consider a variety of sources.

- Uncertainty due to the calibration equipment & calibration processes.
- Uncertainty of the testing instrument as calibrated.
- Uncertainty of the testing instrument during use.
- Uncertainty of the test results.

Uncertainty of measurement is inescapable since no measurement is infinitely precise and no measurement can be performed precisely the same way twice. It is a factor in the development of test methods, training, instrument calibration, and test performance.

In the event the client requests the measurement of uncertainty to be reported with the analytical results, the following documents will be used to calculate the measurement uncertainty:

"Environmental Analytical Measurement Uncertainty Estimation, Nested Hierarchical Approach", Defense Technical Information Center #ADA396946, 2001. This reference includes the SOP and EXCEL calculator prepared by Defense Technical Information Center to support this document; and "CCIL Protocol for Estimating Measurement Uncertainty Using QC Data (Type A)", Mark Hugdahl, Technical Manager, ALS Environmental (Vancouver), & the CCIL Committee on Measurement Uncertainty, Version 1.0 (June 23, 2003).

A variety of choices are made during the calculation of uncertainty of measurement. Care will be taken to evaluate the importance of the various components as they pertain to the project.

Interpretation of the data produced using these procedures will be carefully evaluated based on experience of personnel employed by the laboratory and the existing validation data. The laboratory will take precautions to ensure that the form of reporting does not imply more certainty than determined by the procedures for determining uncertainty of measurement.

18.8. Control Charts

Control charts are based upon a concept developed by Walter Shewart in 1934. The mean and standard deviation (n-1) for at least twenty measurements are determined. A line representing the mean is drawn on the chart. The upper and lower control limits, which are defined as plus and minus three times the standard deviation from the mean, are calculated and drawn on the chart. The range between the upper and lower control limits represents 99 percent of the normal distribution of observations. The upper and lower warning limits, which are defined as plus and minus three two times the standard deviation from the mean, are also calculated and drawn on the chart. The range between the upper and lower warning limits represents 95 percent of the normal distribution of observations. The methods provide specifications for acceptance criteria used to evaluate the result of a quality control indicator (QCI). Normally, the statistical limits generated by a single laboratory is expected to equal or be narrower than the method specification.

The following control charts or tabulations are maintained:

Metals:

Matrix Spike / Matrix Spike Duplicates
- Drinking Water / Dissolved Aqueous (undigested) Matrix
- Aqueous (digested) Matrix
- Soil Matrix

Laboratory Control Samples

Conventionals:

Matrix Spike / Matrix Spike Duplicates
    Aqueous Matrix
    Soil Matrix
Continuing Calibration Verification Sample
Laboratory Control Samples

Organics:

Surrogates
    Aqueous Matrix
    Soil Matrix
Matrix Spike / Matrix Spike Duplicates
    Aqueous Matrix
    Soil Matrix
Laboratory Control Samples

18.9. Interpretation of Control Charts

Control limits represent the normal distribution of a set of observations.
As a general guide, the following conditions indicate a problem exists and initiates the corrective action process:

- A point is outside the control limits
- Seven consecutive points in an increasing trend
- Seven consecutive points in a decreasing trend
- Seven consecutive points above the mean
- Seven consecutive points below the mean
- Three consecutive points occur between the warning and control limits

Out of control data is flagged as it is entered into LIMS. If an assigned cause for the failure is known, the out of control data point will be excluded from the control limit calculations. The control charts are examined for patterns of failure that indicate the need for corrective action investigation into the cause of the failure(s).

18.10. Analytical Record

The following essential information associated with analysis will ill be documented in the analytical record:

- Laboratory ID
- Date & time of analysis
- Instrumetn identification and operating conditions

- Analyte
- Analysis type
- Manual calculations
- Analyst intials / signature

18.12. Non-Standard Methods

When non-standard methods are used, all of the applicable procedures noted in sections 18.1. through 18.11. will be utilized to assure the quality of the test

18.13. References

SOP #106 titled, "IDC & IDMP"
SOP #129 titled, "QCI Inorganic & Organic"
SOP #110 titled "Organic QC"
SOP #102 titled, "Calibration Curves, Inorganic"
SOP #114 titled, "Calibration Curves, Organic"
SOP #109 titled, "MDL"
SOP #112 titled, "Statistical Control"
"Environmental Analytical Measurement Uncertainty Estimation, Nested Hierarchical Approach", Defense Technical Information Center #ADA396946, 2001. This reference includes the SOP and EXCEL calculator prepared by Defense Technical Information Center to support this document.
"CCIL Protocol for Estimating Measurement Uncertainty Using QC Data (Type A)", Mark Hugdahl, Technical Manager, ALS Environmental (Vancouver), & the CCIL Committee on Measurement Uncertainty, Version 1.0 (June 23, 2003).

19. Reporting the Results

19.1. Introduction

Results of analyses need to be reported objectively, accurately, and unambiguously. Data reduction is performed in accordance with internally established rules and conventions that meet method requirements. The content of the Analytical Report or Certificate of Analysis includes all information requested by the client and necessary for the interpretation of the analytical results, as well as, information required by the method. Quality control data is normally retained on file for reference. Quality control data packages can be prepared per client request.

19.2. Data Reduction

Following analysis, the raw data must be reduced to produce a final value to be reported. The specific calculations are included in the actual method references and method SOPs.

19.2.1. Significant Figures

All digits in a reported result are expected to be known definitely, except for the last digit, which may be in doubt. If more than a single doubtful digit is carried, the extra digit or digits are not significant. Report only such figures as are justified by the accuracy of the work. The reporting limits routinely used by the laboratory establishes significant figures for results. If the sample is analyzed at a dilution the number of significant figures used for reporting is adjusted accordingly.

Example:
Routine reporting limit for nitrite is 0.01 mg/L.
If the sample was analyzed at a 10x, the reporting limit changes to 0.1 mg/L.
If the sample was analyzed at a 100 x, the reporting limit changes to 1 mg/L.

19.2.2. Rounding

Round off by dropping digits that are not significant. If the digit 6,7,8,9 is dropped, increase preceding digit by one unit; if the digit 0,1,2,3,4 is dropped, do no not alter preceding digit. If the digit 5 is dropped, round off preceding digit to the nearest even number.

Example:
2.25 becomes 2.2 and 2.35 becomes 2.4

Generally, First Environmental does not report more than three significant figures.

Example:
11,642 becomes 11,600
1,162 becomes 1,160

19.2.3. Ambiguous Zeros

In a number written as 5.00, it is understood that all the zeros are significant, or else the number could have been rounded off to 5.0, 5 or whichever was appropriate.

In a number written as 0.52, the zero serves as a place holder. This avoids possible questioning in regards to a real number being excluded (.52).

19.2.4. Dry Weight vs. Wet Weight

Results for waste analyses (with the exception of TCLP analyses) are expressed on an "as is" basis (i.e., the sample results are not corrected for percent moisture). This is in accordance with protocols for "waste" materials.

Results for soils, sediments, and sludges are expressed on a dry weight basis per method protocols.

The calculation for converting wet weight results to dry weight is as follows:

$$\text{sample concentration} = \frac{\text{analyte concentration}}{\text{decimal equivalent of the percent total solids}}$$

19.2.5. Data Quality Flags

The following data flags may be used to qualify the data.

"J": Indicates an estimated concentration. This flag is used when reporting a result that is less than the routine reporting limit but greater than the method detection limit.

"B": Indicates the analyte was found in the associated blank as well as the sample. Common lab contaminants include, acetone, 2-butanone, and methylene chloride, and Bis-2ethylhexylpthalate.

"E": Indicates an estimated value. This flag may be used when the internal standard recovery for the associated compounds fails to meet acceptance criteria. Failure to meet acceptance criteria is due to the presence of a matrix interference. It may also be used to indicate the reported value exceeds the calibration range of the instrument.

"L": The analyte was detected as part of a GC/MS database search. The identification is considered tentative and the concentration is estimated.

"N": Analyte is not part of our NELAC accreditation
"S": Analyte was sub-contracted to another laboratory for analysis.

Other data quality flags may be utilized and appropriately defined in the case narrative.

19.3. Test Reports

The final report sent to the client consists of the following:

19.3.1. Cover Letter

19.3.1.1. A signed cover letter listing the client's name and address, client's project ID, *First Environmentals' File ID* (batch ID), and date of sample receipt.

The following statement is included in the cover letter:
"All analyses were preformed in accordance with established methods and within established holding times. All Quality Control criteria as outlined in the methods and current IL ELAP/NELAP have been met unless otherwise noted. QA/QC documentation and raw data will remain on file for future reference. Our certificate is number is XXXXXX: XX/XX/XX through XX/XX/XX"

19.3.2. Case Narrative

19.3.1.2. A case narrative is included, when necessary for the interpretation of test results, to explain the use of data quality flags, additions or exclusions to the test method, non-standard conditions that may have affected the quality of results, and specific exceptions to routine protocols or failures to meet method criterion.

Failures to meet sample acceptance criteria, such as, temperature compliance, are noted directly on the chain of custody. Failure to meet sample acceptance criteria other than temperature compliance, such as holding time or chemical preservation, will be included in the case narrative.

When required, a statement of the estimated uncertainty of the test results can be provided with the analytical result. Information on uncertainty is needed when a client's instruction requires.

In the event that an opinion or interpretation of results is requested by the client, the laboratory will document the basis upon which the opinion and interpretation is made. Opinions and interpretations will be clearly marked on the report.

19.3.3. The Analytical Report(s)

Each Analytical Report lists the following:

- Title, e.g., "Analytical Report"
- Client ID
- Project ID
- Sample Number (assigned by the laboratory)
- Sample Description
- Lab File ID (unique identification of the certificate or report)
- Date Received
- Date & Time Taken
- Date Reported
- Analyte or Analyte Group
- Results
- Unit of Measure
- Date Prepared
- Time Prepared if holding time is less than 72 hours
- Date Analyzed
- Time Analyzed if holding time is less than 72 hours
- Analysis Method and Method Revision
- Preparation Method
- Flags (data qualifiers)
- Client specific information as required.
- Specification of whether results for solid sample matrices are either "Dry Weight" or "Wet Weight"

The report format is designed to accommodate various test requests for either multiple or single analyte analyses. Required information is presented in a readable format minimizing the possibility of misinterpretation.

19.3.1.4. The original Chain of Custody Record.

19.3.4. Reports are paginated. Each page of the analytical report lists the laboratories File ID or assigned sample number. The first five digits of the sample number is the File ID or Batch Number.

19.3.5. The Analytical Report(s) and cover letter are printed on laboratory letterhead, which specifies the laboratories' name, address, and phone number. The Project Manager's name, signature and function.

19.3.6. When laboratory personnel performs sampling, this is documented on the chain of custody and in the cover letter accompanying the final report.

19.3.6. Analyses subcontracted to another laboratory will be flagged on the analytical report with an "S" in the flags column. The flag is defined in the case narrative to the report. A electronic copy of subcontracted results is retained in Sentryfile and is available to the client upon request.

19.3.7. Simplification of the reporting procedures requires a written agreement with the client. In the event that the reporting procedures are simplified, data is readily retrievable.

19.3.8. Facsimiles and E-mail documents will contain the following qualifier:

"The pages accompanying this facsimile (E-mail) transmission contain information, which is confidential or privileged. The information is intended to be for the use of the individual or entity named above. If you are not the intended recipient, be aware that any disclosure, copying, distribution or use of the contents of this information is prohibited. If you have received this facsimile in error, please notify us immediately so that we can arrange for the retrieval of the original documents at no cost to you." Alternatively, a stamp will be applied that states "confidential" to the cover page of the facsimile or E-mail.

19.3.9. After completion and delivery of the final Analytical Report to the client, the laboratory will only correct, add or delete information from the report upon directions received from the client. These directions must be appropriately documented. Documentation includes a summary of the change(s), specification of who provided the instructions, the date, and the initials of the person who received the request for correction. Any supplemental report will clearly identify their purpose and will contain all reporting requirements.

19.3.10. In the event that a reporting error is discovered after forwarding the final Analytical Report to the client, the client will be notified immediately in writing. Appropriate actions will be taken to remedy the problem and provide corrected a Analytical Report. The corrected report will provide a summary of the error and the correct action. If the data remains compromised, a written summary of the problem and the scope of impact on the clients' data will be sent to the client.

19.4. References

Refer SOP #818 titled, "LIMS Data Reporting"

20. Definition of Terms Commonly Used in the Environmental Laboratory

DEFINITION OF TERMS & ACRONYMS COMMONLY USED IN THE ENVIRONMENTAL LABORATORY

ACCEPTANCE CRITERIA: specified limits placed on characteristics of an item, process, or service defined in requirement documents. (TNI Standard)

ACCREDITATION: The process by which an agency or organization evaluates and recognizes a laboratory as meeting certain predetermined qualifications or standards, thereby accrediting the laboratory. (TNI Standard)

ACCREDITATION BODY: The territorial, state or federal agency having responsibility and accountability for environmental laboratory accreditation and which grants accreditation. (TNI Standard)

ACCURACY: The degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) components that are due to sampling and analytical operations; a data quality indicator. (TNI Standard)

ANALYSIS DATE: The calendar date of analysis associated with the analytical result reported for an accreditation or experimental field of proficiency testing. (TNI Standard)

ANALYST: The designated individual who performs the "hands-on" analytical methods and associated techniques and who is the one responsible for applying required laboratory practices and other pertinent quality controls to meet the required level of quality. (TNI Standard)

ANALYTICAL UNCERTAINTY: A subset of Measurement Uncertainty that includes all laboratory activities performed as part of the analysis. (TNI Standard)

ASSESSMENT: The evaluation process used to measure or establish the performance, effectiveness, and conformance of an organization and/or its systems to defined criteria (to the standards and requirements of laboratory accreditation). (TNI Standard)

AUDIT: A systematic and independent examination of facilities, equipment, personnel, training, procedures, record-keeping, data validation, data management, and reporting aspects of a system to determine whether QA/QC and technical activities are being conducted as planned and whether these activities will effectively achieve quality objectives. (TNI Standard)

BATCH: Environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A preparation batch is composed of one (1) to twenty (20) environmental samples of the same quality systems matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be twenty-four (24) hours. An analytical batch is composed of prepared environmental samples (extracts, digestates or concentrates) which are analyzed together as a
group. An analytical batch can include prepared samples originating from various quality system matrices and can exceed twenty (20) samples. (TNI Standard)

BIAS: The systematic or persistent distortion of a measurement process, which causes errors in one direction (i.e., the expected sample measurement is different from the sample's true value). (TNI Standard)

BLANK: A sample that has not been exposed to the analyzed sample stream in order to monitorcontamination during sampling, transport, storage or analysis. The blank is subjected to the usual analytical and measurement process to establish a zero baseline or background value and is sometimes used to adjust or correct routine analytical results. (TNI Standard)
Blanks include:

Equipment Blank: a sample of analyte free media which has been used to rinse common sampling equipment to check effectiveness of decontamination procedures. (NELAC 2003)
Field Blank: blank prepared in the field by filling a clean container with pure de-ionized water and appropriate preservative, if any, for the specific sampling activity being undertaken. (EPA OSWER)

Instrument Blank: a clean sample (e.g. , distilled water) processed through the instrumental steps of the measurement process; used to determine instrument contamination. (EPA_QAD)

Method Blank: a sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analytes. (NELAC 2003)

Reagent Blank: (method reagent blank): a sample consisting of reagent(s), without the target analyte or sample matrix, introduced into the analytical procedure at the appropriate point and carried through all subsequent steps to

determine the contribution of the reagents and of the involved analytical steps. (QAMS).

CALIBRATION: A set of operations that establish, under specified conditions, the relationship between values of quantities indicated by a measuring instrument or measuring system, or values represented by a material measure or a reference material, and the corresponding values realized by standards.
1) In calibration of support equipment the values realized by standards are established through the use of reference standards that are traceable to the International System of Units (SI).
2) In calibration according to methods, the values realized by standards are typically established through the use of Reference Materials that are either purchased by the laboratory with a certificate of analysis or purity, or prepared by the laboratory using support equipment that has been calibrated or verified to meet specifications. (TNI Standard)

CALIBRATION CURVE: The mathematical relationship between the known values, such as concentrations, of a series of calibration standards and their instrument response. Calibration Standard: A substance or reference material used for calibration. (TNI Standard)

CALIBRATION STANDARD: a substance or reference material used to calibrate an instrument. (QAMS)

CERTIFIED REFERENCE MATERIAL (CRM): Reference material, accompanied by a certificate, having a value, measurement uncertainty, and stated metrological traceability chain to a national metrology institute. (TNI Standard)

CHAIN OF CUSTODY FORM: Record that documents the possession of the samples from the time of collection to receipt in the laboratory. This record generally includes: the number and types of containers; the mode of collection; the collector; time of collection; preservation; and requested analyses. See also Legal Chain of Custody Protocols. (TNI Standard)

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSTATION AND LIABILITY ACT (CERCLA/SUPERFUND): the enabling legislation in 42 U.S.C. 9601-9675 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (ARA), 42 U.S.C. 9601 et seq., to eliminate the health and environmental threats posed by hazardous waste sites. (NELAC 2003)

CONFIDENTIAL BUSINESS INFORMATION (CBI): information that an organization designates as having the potential of providing a competitor with inappropriate insight into its management, operation or products.

CONFIRMATION: Verification of the identity of a component through the use of an approach with a different scientific principle from the original method. These may include, but are not limited to: second column confirmation, Alternate wavelength, derivatization, Mass spectral interpretation, Alternative detectors, or Additional cleanup procedures. (TNI Standard)

CONFORMANCE: an affirmative indication or judgment that a product or service has met the requirements of the relevant specifications, contract, or regulation; also the state of meeting the requirements (ANSI/ANQC E4-1994)

CONTINUING CALIBRATION BLANK (CCB): A blank that is typically analyzed at the beginning of each analytical batch to verify that the instrument baseline is zero and that the instrument is free of contamination. This is used primarily for metals and wet chemistry analyses.

CONTINUING CALIBRATION VERIFICATION STANDARD (CCVS): A mid-level standard which is analyzed with each analytical batch to verify the initial calibration.

CORRECTIVE ACTION: the action taken to eliminate the causes of an existing nonconformity, defect or other undesirable situation in order to prevent recurrence. (ISO 8402)

DATA AUDIT: a qualitative and quantitative evaluation of the documentation and procedures associated with environmental measurements to verify that the resulting data are of acceptable quality (i.e., that they meet specified acceptance criteria). (NELAC 2003)

DATA REDUCTION: The process of transforming the number of data items by arithmetic or statistical calculation, standard curves, and concentration factors, and collating them into a more useful form. (TNI Standard)

DEMONSTRATION OF CAPABILITY: A procedure to establish the ability of the analyst to generate analytical results of acceptable accuracy and precision. (TNI Standard)

DETECTION LIMIT: the lowest concentration or amount of the target analyte that can be identified, measured, and reported with confidence that the analyte concentration is not a false positive value. See Method Detection Limit. (NELAC 2003)

DOCUMENT CONTROL: The act of ensuring that documents (and revisions thereto) are proposed, reviewed for accuracy, approved for release by authorized personnel, distributed properly and controlled to ensure use of the correct version at the location where the prescribed activity is performed. (ASQC)

ESTIMATED QUANTITATION LIMIT (EQL): The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The EQL is generally 5 to 10 times the MDL. However, it may be nominally chosen within these guidelines to simplify data reporting. For many analytes the EQL analyte concentration is selected as the lowest non-zero standard in the calibration curve. Sample EQLs are highly matrix-dependent. The EQLs in SW-846 are provided for guidance and may not always be achievable. (SW-846 Chapter 1)

EXPERIMENTAL FIELD OF PROFICIENCY TESTING (EXPERIMENTAL FOPT): Analytes for which a laboratory is required to analyze a PT sample if they seek or maintain accreditation for the field of accreditation but for which successful analysis is not required in order to obtain or maintain accreditation. (TNI Standard)

FIELD OF ACCREDITATION: Those matrix, technology/method, and analyte combinations for which the accreditation body offers accreditation. (TNI Standard)

FINDING: An assessment conclusion referenced to a laboratory accreditation standard and supported by objective evidence that identifies a deviation from a laboratory accreditation standard requirement. (TNI Standard)

FIELD DUPLICATES: Independent samples that are collected as close as possible to the same point in space and time. They are two separate samples taken from the same source, stored in separate containers, and analyzed independently. These duplicates are useful in documenting the precision of the sampling process.

FIELD MEASUREMENT: The determination of physical, biological, or radiological properties, or chemical constituents; that are measured on-site, close in time and space to the matrices being sampled/measured, following accepted test methods. This testing is performed in the field outside of a fixed-laboratory or outside of an enclosed structure that meets the requirements of a mobile laboratory.

FIELD OF PROFICIENCY TESTING (FOPT): Analytes for which a laboratory is required to successfully analyze a PT sample in order to obtain or maintain accreditation, collectively defined as: matrix, technology/method, analyte. (TNI Standard)

HOLDING TIMES: The maximum time that can elapse between two (2) specified activities.

INITIAL DEMONSTRATION OF CAPABILITY (IDC) / INITIAL DEMONSTRATION OF METHOD PERFORMANCE (IDMP): The IDC/IDMP verifies and demonstrates that the instrument, method, and/or analyst is capable of generating precise and accurate analytical data. It is used to validate new analyst and new instrument performance, and to validate changes in analytical equipment or technique.

INITIAL CALIBRATION VERIFICATION STANDARD (ICVS): An ICVS verifies that the standards used to construct the curve were chemically pure, prepared properly, and that they have not degraded significantly since they were made. The ICVS should be obtained from a different source than that used to prepare the standards for constructing the calibration curve. The concentration of the ICVS should be 10%-50% of the maximum calibration range unless specified otherwise in the method. Ideally, the source is a different manufacturer altogether and the manufacturer predetermines the concentration. This standard does not go through sample preparation.

INTERFERENCE CHECK STANDARD (ICS): A standard that contains interfering elements at high concentrations and other non-interfering elements at trace concentrations to prove that the background correction intervals and inter-element correction factors have been set properly. Used in ICP metals analysis only.

INTERIM ACCREDITATION: temporary accreditation status for a laboratory that has met all accreditation criteria except for a pending on-site assessment which has been delay ed for reasons beyond the control of the laboratory. (NELAC 2003)

INTERNAL STANDARD: A known amount of standard added to a test portion of a sample as a reference for evaluating and controlling the precision and bias of the applied analytical method. (TNI Standard)

INTERNATIONAL SYSTEM OF UNITS (SI): the coherent system of units adopted and recommended by the General Conference on Weights and Measures. (CCGPM) (VIM 1.12)

LABORATORY CONTROL SAMPLE (however named, such as laboratory fortified blank, spiked blank, or QC check sample): A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes and taken through all sample preparation and analytical steps of the procedure unless otherwise noted in a reference method. It is generally used to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. (TNI Standard)

LEGAL CHAIN OF CUSTODY PROTOCOLS: Procedures employed to record the possession of samples from the time of sampling through the retention time specified by the client or program. These procedures are performed at the special request of the client and include the use of a Chain of Custody Form that documents the collection, transport, and receipt of compliance samples by the laboratory. In addition, these protocols document all handling of the samples within the laboratory. (TNI Standard)

LINEAR DYNAMIC RANGE (LDR): The concentration range over which the analytical curve remains linear.

LIMIT(S) OF DETECTION (LOD): A laboratory's estimate of the minimum amount of an analyte in a given matrix that an analytical process can reliably detect in their facility. (TNI Standard)

LIMIT(S) OF QUANTITATION (LOQ): The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. (TNI Standard)

MATRIX: The substrate of a test sample. (TNI Standard)

Drinking Water: any aqueous sample that has been designated a potable or potential potable water source.

Non-Potable Water: any aqueous sample excluded from the definition of Drinking Water matrix. Includes surface water, groundwater, effluents, water treatment chemicals, and TCLP or other extracts.

Solid and Chemical Materials: includes soils, sediments, sludges, products and by-products of an industrial process that results in a matrix not previously defined.

Biological Tissue: any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.

Air and Emissions: whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbent tube, impinger solution, filter, or other device. (NELAC 2003)

Quality System Matrix: These matrix definitions are an expansion of the field of accreditation matrices and shall be used for purposes of batch and quality control requirements :

Aqueous: any aqueous sample excluded from the definition of Drinking Water matrix or Saline/Estuarine source. Includes surface water, groundwater, effluents, and TCLP or other extracts.

Drinking Water: any aqueous sample that has been designated a potable or potential potable water source.

Saline/Estuarine: any aqueous sample from an ocean or estuary, or other salt water source such as the Great Salt Lake.

Non-aqueous Liquid: any organic liquid with <15% settleable solids.

Biological Tissue: any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.

Solids: includes soils, sediments, sludges and other matrices with >15% settleable solids.

Chemical Waste: a product or by-product of an industrial process that results in a matrix not previously defined.

Air and Emissions: whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbent tube, impinger solution, filter, or other device. (NELAC 2003)

MATRIX DUPLICATE: A replicate matrix prepared in the laboratory and analyzed to obtain a measure of precision. (TNI Standard)

MATRIX SPIKE (SPIKED SAMPLE OR FORTIFIED SAMPLE): A sample prepared, taken through all sample preparation and analytical steps of the procedure unless otherwise noted in a referenced method, by adding a known amount of target analyte to a specified amount of sample for which an independent test result of target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency. (TNI Standard)

MATRIX SPIKE DUPLICATE (SPIKED SAMPLE OR FORTIFIED SAMPLE DUPLICATE): A replicate matrix spike prepared in the laboratory and analyzed to obtain a measure of the precision of the recovery for each analyte. (TNI Standard)

MAY: denotes permitted action, but not required action. (NELAC 2003)

MATERIAL SAFETY DATA SHEETS (MSDS): Written information provided by vendors concerning a chemical's toxicity, health hazards, physical properties, fire, and reactivity data including storage, spill, and handling precautions.

MEASUREMENT SYSTEM: A method, as implemented at a particular laboratory, and which includes the equipment used to perform the test and the operator(s).

METHOD: A body of procedures and techniques for performing an activity (e.g., sampling, chemical analysis, quantification), systematically presented in the order in which they are to be executed. (TNI Standard)

METHOD DETECTION LIMIT (MDL): one way to establish a Limit of Detection, defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

MOBILE LABORATORY: A portable enclosed structure with necessary and appropriate accommodation and environmental conditions for a laboratory, within which testing is performed by analysts. Examples include but are not limited to trailers, vans, and skid-mounted structures configured to house testing equipment and personnel.

MUST: denotes a requirement that must be met. (Random House College Dictionary)

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST): A federal agency of the US Department of Commerce's Technology Administration that is designed as the United States national metrology institute (NMI). (TNI Standard)

NATIONAL ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM (NELAP): the overall National Environmental Laboratory Accreditation Program of which NELAC is a part. (NELAC 2003)

NEGATIVE CONTROL: measures taken to ensure that a test, its components, or the environment do not cause undesired effects, or produce incorrect test results. (NELAC 2003)

ORGANIC-FREE REAGENT WATER: For volatiles, all references to water in the methods refer to water in which an interferant is not observed at the method detection limit of the compounds of interest. Organic-free reagent water can be generated by passing tap water through a carbon filter bed containing about 1 pound of activated carbon. A water purification system may be used to generate organic-free deionized water. Organic-free reagent water may also be prepared by boiling water for 15 minutes and, subsequently, while maintaining the temperature at 90°C, bubbling a contaminant-free inert gas through the water for 1 hour.

For semivolatiles and nonvolatiles, all references to water in the methods refer to water in which an interferant is not observed at the method detection limit of the compounds of interest. Organic-free reagent water can be generated by passing tap water through a carbon filter bed containing about 1 pound of activated carbon. A water purification system may be used to generate organic-free deionized water.

POSITIVE CONTROL: measures taken to ensure that a test and/or its components are working properly and producing correct or expected results from positive test subjects. (NELAC 2003)

PRECISION: The degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves; a data quality indicator. Precision is usually expressed as standard deviation, variance or range, in either absolute or relative terms. (TNI Standard)

PRESERVATION: Any conditions under which a sample must be kept in order to maintain chemical and/or biological integrity prior to analysis. (TNI Standard)

PRIMARY ACCREDITATION BODY (PRIMARY AB): The accreditation body responsible for assessing a laboratory's total quality system, on-site assessment, and PT performance tracking for fields of accreditation. (TNI Standard)

PROCEDURE: A specified way to carry out an activity or process. Procedures can be documented or not. (TNI Standard)

PROFICIENCY TESTING: A means of evaluating a laboratory's performance under controlled conditions relative to a given set of criteria through analysis of unknown samples provided by an external source. (TNI Standard)

PROFICIENCY TESTING PROGRAM: The aggregate of providing rigorously controlled and standardized environmental samples to a laboratory for analysis, reporting of results, statistical evaluation of the results and the collective demographics and results summary of all participating laboratories. (TNI Standard)

PROFICIENCY TESTING PROVIDER (PTP): A person or organization accredited by the TNI-approved Proficiency Testing Provider Accreditor to operate a TNI-compliant PT program. (TNI Standard)

PROFICIENCY TESTING PROVIDER ACCREDITOR (PTPA): An organization that is approved by TNI to accredit and monitor the performance of proficiency testing providers. (TNI Standard)

PROFICIENCY TEST SAMPLE (PT): A sample, the composition of which is unknown to the laboratory and is provided to test whether the laboratory can produce analytical results within the specified acceptance criteria. (TNI Standard)

PROFICIENCY TESTING STUDY (PT STUDY): A single complete sequence of circulation of proficiency testing samples to all participants in a proficiency test program. (TNI Standard)

PROTOCOL: A detailed written procedure for field and/or laboratory operation (e.g., sampling, analysis) which must be strictly followed. (TNI Standard)

PT STUDY CLOSING DATE: The calendar date for which analytical results for a PT sample shall be received by the pt provider from the laboratory. (TNI STANDARD)

PT STUDY OPENING DATE: The calendar date that a PT sample is first made available to any laboratory by a PT provider. (TNI Standard)

QUALITY ASSURANCE: An integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the client. (TNI Standard)

QUALITY ASSURANCE (PROJECT) PLAN (QAPP): a formal document describing the detailed quality control procedures by which the quality requirements defined for the data and decisions pertaining to a specific project are to be achieved. (EPA-QAD)

QUALITY CONTROL: The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer; operational techniques and activities that are used to fulfill requirements for quality; also the system of activities and checks used to ensure that measurement systems are maintained within prescribed limits, providing protection against "out of control" conditions and ensuring that the results are of acceptable quality. (TNI Standard)

QUALITY CONTROL SAMPLE: A sample used to assess the performance of all or a portion of the measurement system. One of any number of samples, such as Certified Reference Materials, a quality system matrix fortified by spiking, or actual samples fortified by spiking, intended to demonstrate that a measurement system or activity is in control. (TNI Standard)

QUALITY MANUAL: A document stating the management policies, objectives, principles, organizational structure and authority, responsibilities, accountability, and

implementation of an agency, organization, or laboratory, to ensure the quality of its product and the utility of its product to its users. (TNI Standard)

QUALITY SYSTEM: A structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required quality assurance (QA) and quality
control (QC) activities. (TNI Standard)

QUALITY SYSTEM MATRIX: These matrix definitions are to be used for purposes of batch and quality control requirements:
Air and Emissions: Whole gas or vapor samples including those contained in flexible or rigid wall containers
and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbant tube,
impinger solution, filter, or other device.
Aqueous: Any aqueous sample excluded from the definition of Drinking Water or Saline/Estuarine. Includes surface water, ground water effluents, and TCLP or other extracts.
Biological Tissue: Any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.
Chemical Waste: A product or by-product of an industrial process that results in a matrix not previously defined.
Drinking Water: Any aqueous sample that has been designated a potable or potential potable water source.
Non-Aqueous Liquid: Any organic liquid with <15% settleable solids.
Saline/Estuarine: Any aqueous sample from an ocean or estuary, or other salt water source such as the Great Salt Lake.
Solids: Includes soils, sediments, sludges and other matrices with >15% settleable solids. (TNI Standard)

RAW DATA: The documentation generated during sampling and analysis. This documentation includes, but is not limited to, field notes, electronic data, magnetic tapes, untabulated sample results, QC sample results, print outs of chromatograms, instrument outputs, and handwritten records. (TNI Standard)

REAGENT GRADE: Analytical reagent (AR) grade, ACS reagent grade, and reagent grade are synonymous terms for reagents which conform to the current specifications of the Committee on Analytical Reagents of the American Chemical Society.

REAGENT WATER: Water that has been generated by any method which would achieve the performance specifications for ASTM Type II water. For organic analyses, see the definition of organic-free reagent water.

REFERENCE MATERIAL: a material or substance one or more properties of which are sufficiently well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials. (IS) Guide 30-2.1)

REFERENCE STANDARD: a standard, generally of the highest metrological quality available at a given location, from which measurements made at the location are derived. (VIM-6.08)

REPLICATE ANALYSES: the measurements of the variable of interest performed identically on two or more sub-samples of the same sample within a short time interval. (NELAC 2003)

REQUIREMENT: denotes a mandatory specification; often designated by the term "shall". (NELAC 2003)

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA): the enabling legislation under 42 USC 321 *et seq.* (1976), that gives EPA the authority to control hazardous waste from the "cradle-to-grave", including its generation, transportation, treatment, storage, and disposal. (NELAC 2003)

REFERENCE MATERIAL: Material or substance one or more of whose property values are sufficiently homogeneous and well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials. (TNI Standard)

REFERENCE STANDARD: Standard used for the calibration of working measurement standards in a given organization or at a given location. (TNI Standard)

REVOCATION: The total or partial withdrawal of a laboratory's accreditation by an accreditation body. (TNI Standard)

SAFE DRINKING WATER ACT (SDWA): the enabling legislation, 42 USC 300 f *et seq.* (1974), (Public Law 93-523), that requires the EPA to protect the quality of drinking water in the U.S. by setting maximum allowable contaminant levels, monitoring, and enforcing violations. (NELAC)

SAMPLE: Any solution or media introduced into an analytical instrument on which an analysis is performed excluding calibration standards, initials calibration verification check standards, calibration blanks, and continuing calibration verification check standards.

SAMPLING: Activity related to obtaining a representative sample of the object of conformity assessment, according to a procedure. (TNI Standard)

SAMPLE TRACKING: procedures employed to record the possession of the samples from the time of sampling until analysis, reporting, and archiving. These procedures include the use of a Chain of Custody Form that documents the collection, transport, and receipt of compliance samples to the laboratory. In addition, access to the laboratory is limited and controlled to protect the integrity of samples (NELAC 2003)

SELECTIVITY: The ability to analyze, distinguish, and determine a specific analyte or parameter from another component that may be a potential interferent or that may behave similarly to the target analyte or parameter within the measurement system. (TNI Standard)

SENSITIVITY: The capability of a method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. (TNI Standard)

SHALL: denotes a requirement that is mandatory whenever the criterion for conformance with the specification requires that there be no deviation. This does not prohibit the use of alternative approaches or methods for implementing the specification so long as the requirement is fulfilled. (ANSI)

SHOULD: denotes a guideline or recommendation whenever noncompliance with the specification is permissible (ANSI)

SPIKE: a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery efficiency or for other quality control purposes. (NELAC 2003)

SPLIT SAMPLES: Aliquots of sample taken from the same container and analyzed independently. In cases where aliquots of samples are impossible to obtain, field duplicate samples should be taken for the matrix duplicate analysis. These are usually taken after mixing or compositing and are used to document intra- or inter-laboratory precision.

STANDARD: The document describing the elements of laboratory accreditation that has been developed and established within the consensus principles of standard setting and

meets the approval requirements of standard adoption organizations procedures and policies. (TNI Standard)

STANDARD ADDITION: The practice of adding a known amount of an analyte to a sample immediately prior to analysis. It is typically used to evaluate interferences.

STANDARD METHOD: a test method issued by an organization generally recognized as competent to do so.

STANDARD OPERATING PROCEDURES (SOPS): A written document that details the method for an operation, analysis, or action, with thoroughly prescribed techniques and steps. SOPs are officially approved as the methods for performing certain routine or repetitive tasks. (TNI Standard)

STANDARDIZED REFERENCE MATERIAL (SRM): a certified reference material produced by the U.S. National Institute of Standards and Technology or other equivalent organization and characterized for absolute content, independent of analytical method. (EPA_QAD)

STUDY: This term refers to a PT Study or Supplemental PT Study. (TNI Standard)

SUPPLEMENTAL PROFICIENCY TESTING STUDY (SUPPLEMENTAL PT STUDY): A PT sample that may be from a lot previously released by a PT Provider that meets the requirements for supplemental PT samples given in Volume 3 of this Standard but that does not have a pre-determined opening date and closing date. (TNI Standard)

SURROGATE: a substance with properties that mimic the analyte of interest. It is unlikely to be found in environment samples and is added to them for quality control purposes. (QAMS)

SUSPENSION: The temporary removal of a laboratory's accreditation for a defined period of time, which shall not exceed six (6) months or the period of accreditation, whichever is longer, in order to allow the laboratory time to correct deficiencies or area of non-conformance with the Standard. (TNI Standard)

TNI PT BOARD: A board consisting of TNI members or affiliates, appointed by the TNI Board of Directors, which is responsible for the successful implementation and operation of the TNI Proficiency Testing Program. The duties of the TNI PT Board are defined in the TNI PT Board Charter. (TNI Standard)

TRACEABILITY: The ability to trace the history, application, or location of an entity by means of recorded identifications. In a calibration sense, traceability relates measuring equipment to national or international standards, primary standards, basic physical

constants or properties, or reference materials. In a data collection sense, it relates calculations and data generated throughout the project back to the requirements for the quality of the project. (TNI Standard)

TRIP BLANK: A sample of analyte-free media taken from the laboratory to the sampling site and returned to the laboratory unopened. A trip blank is used to document contamination attributable to shipping and field handling procedures. This type of blank is useful in documenting contamination of volatile organics samples.

TECHNOLOGY: A specific arrangement of analytical instruments, detection systems, and/or preparation techniques. (TNI Standard)

VERIFICATION: Confirmation by examination and objective evidence that specified requirements have been met.
NOTE: In connection with the management of measuring equipment, verification provides a means for checking that the deviations between values indicated by a measuring instrument and corresponding known values of a measured quantity are consistently smaller than the maximum allowable error defined in a standard, regulation or specification peculiar to the management of the measuring equipment.
The result of verification leads to a decision either to restore in service, to perform adjustment, to repair, to downgrade, or to declare obsolete. In all cases, it is required that a written trace of the verification performed shall be kept on the measuring instrument's individual record. (TNI Standard)

VALIDATION: the confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled.

VERIFICATION: confirmation by examination and provision of evidence that specified requirements have been met. (NELAC 2003)

> NOTE: In connection with the management of measuring equipment, verification provides a means for checking that the deviations between values indicated by a measuring instrument and corresponding known values of a measured quantity are consistently smaller than the maximum allowable error defined in a standard, regulation or specification peculiar to the management of the measuring equipment.
>
> The result of verification leads to a decision either to restore in service, to perform adjustment, to repair, to downgrade, or to declare obsolete. In all cases, it is required that a written trace of the verification performed shall be kept on the measuring instrument's individual record.

WORK CELL: a well-defined group of analysts that together perform the method analysis. The members of the group and their specific functions within the work cell must be fully documented. (NELAC 2003)

WORKING RANGE: the difference between the Limit of Quantitation and the upper limit of measurement system calibration.

SOURCES:

40CFR Part 136 Guidelines Establishing Test Procedures for the Analysis of Pollutants

American Society for Quality Control (ASQC), Definitions of Environmental Quality Assurance Terms, 1996

American National Standards Institute (ANSI), Style Manual for Preparation of Proposed American National Standards, Eighth Edition, March 1991

ANSI N42.23-1995, Measurement and Associated Instrument Quality Assurance for Radiobioassay Laboratories

ANSI/ASQC E4, 1994

ANSI N42.23-1995, Measurement and Associated Instrument Quality Assurance for

International Standards Organization (ISO) Guides 2, 30, 8402

International Vocabulary of Basic and General Terms in Metrology (VIM): 1984. Issued by BIPM, IEC, ISO, and OIML

International Organization for Standardization (ISO)/IEC and International Organization of Legal Metrology (OIML)

National Institute of Standards and Technology (NIST)

National Environmental Laboratory Accreditation Conference (NELAC), July 2003 Standards

(QAMS), Glossary of Terms of Quality Assurance Terms, 8/31/92 and 12/6/95

Radiobioassay Laboratories International Vocabulary of Basic and General Terms in Metrology (VIM): 1984. Issued by Bureau

Random House College Dictionary

United States Environmental Protection Agency (US EPA) Quality Assurance Management Section

Uniform Federal Policy for Quality Assurance Project Plans (UFP QAPP) March 2005

US EPA Quality Assurance Management Section (QAMS), Glossary of Terms of Quality Assurance Terms, 8/31/92 and 12/6/95

US EPA Quality Assurance Division (QAD)

Webster's New World Dictionary of the American Language

VIM – Draft edition October 2005

TNI Technical Modules, as follows:
Volume 1, Module 3 Quality Systems for Asbestos Testing
Volume 1, Module 4 Quality Systems for Chemical Testing
Volume 1, Module 5 Quality Systems for Microbiological Testing
Volume 1, Module 6 Quality Systems for Radiochemical Testing
Volume 1, Module 7 Quality Systems for Toxicity Testing

21. Use of Accreditation

21.1. The laboratory will display the most recent accreditation certificate.

21.2. The laboratory will ensure that statements made concerning accreditation fields of testing and accreditation status are accurate.

21.3. If the laboratory chooses to use the TNI logo or accrediting authority's name, the phrase "TNI" and the laboratory's accreditation number will be included. This applies to catalogs, advertisements, business solicitations, proposals, quotations and Analytical Reports.

21.4. The laboratories use of TNI certificate, TNI accreditation status and/or TNI logo do not constitute or imply endorsement by the accrediting authority and should never be construed as endorsement by the accrediting authority.

22. References

National Environmental Laboratory Accreditation Conference (NELAC), Quality Systems, Approved July 12, 2002.

"Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods", SW-846, Third Edition, July 1992 and it's updates.

"Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, Revised March 1983.

"Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", EPA 600/4-82-057, Revised July 1982.

"Standard Methods for the Examination of Water and Wastewater", 18th Edition, 1992. (This edition is utilized for the analysis of samples requiring compliance with Illinois Drinking Water Laboratory Certificate Program.)

"Standard Methods for the Examination of Water and Wastewater", 19th Edition, 1995.

"Methods for the Determination of Organic Compounds in Drinking Water" EPA/600/4-88/039, July 1991.

"Methods for the Determination of Organic Compounds in Drinking Waters – Supplement II," EPA/600/R-92/29, August 1992.

"Methods or the Determination of Inorganic Substance in Environmental Samples," EPA/600/R-93/100, August 1993.

"Methods or the Determination of Metals in Environmental Samples – Supplement I," EPA/600/R-94-111, May 1994.

"Technical Notes on Drinking Water Methods," EPA-600/R-94-173.

"USEPA Contract Laboratory Program, Statement of Work for Organics Analysis," OLM01.0, Including Rev. OLM01.1 (December 1990) and Rev. OLM01.2 (January 1991).

"Laboratory Data Validation , Functional Guidelines for Evaluating Inorganics Anayses", USEPA, July, 1988.

"Laboratory Data Validation , Functional Guidelines for Evaluating Organics Analyses", USEPA, February, 1988.

"Handbook for Analytical Quality Control in Water and Wastewater Laboratories", EPA 600/4-79-019.

"Quality Assurance Principles for Analytical Laboratories", 2nd Ed., 1991.

"Manual for the Certification of Laboratories Analyzing Drinking Water," 4th Edition, March 1997.

"Quality Assurance for Chemical Measurement," John Keenan Taylor, Lewis Publishers Inc., 1987.

NELAC 2003 Standard

"Environmental Analytical Measurement Uncertainty Estimation, Nested Hierarchical Approach", Defense Technical Information Center #ADA396946, 2001. This reference includes the SOP and EXCEL calculator prepared by Defense Technical Information Center to support this document.

"CCIL Protocol for Estimating Measurement Uncertainty Using QC Data (Type A)", Mark Hugdahl, Technical Manager, ALS Environmental (Vancouver), & the CCIL Committee on Measurement Uncertainty, Version 1.0 (June 23, 2003).

APPENDIX I

Title 2 – Pretreatment

Rock River Water Reclamation District (RRWRD) Code of Ordinances

TITLE 2

PRETREATMENT

ARTICLE I. GENERAL PROVISIONS

SECTION 1. Purpose and Policy

This Title sets forth uniform requirements for Users of the Rock River Water Reclamation District (District) and enables the District to comply with all applicable State and Federal laws, including the Clean Water Act (33 United States Code [U.S.C.] section 1251 et seq.) and the General Pretreatment Regulations (Title 40 of the *Code of Federal Regulations* [CFR] Part 403). The objectives of this Title are:

A. To prevent the introduction of pollutants into the District that will interfere with its operation;

B. To prevent the introduction of pollutants into the District that will pass through the District inadequately treated, into receiving waters, or otherwise be incompatible with the District;

C. To protect both the District personnel who may be affected by wastewater and sludge in the course of their employment and the general public;

D. To promote reuse and recycling of industrial wastewater and sludge from the District;

E. To provide for fees for the equitable distribution of the cost of operation, maintenance, and improvement of the District; and

F. To enable the District to comply with its National Pollutant Elimination System permit conditions, sludge use and disposal requirements and any other Federal or State laws to which the District is subject.

This Title shall apply to all Users of the District. This Title authorizes the issuance of individual and general wastewater discharge permits; provides for monitoring, compliance, and inspection activities; establishes administrative review procedures; and requires Industrial User reporting.

SECTION 2. Administration

Except as otherwise provided herein, the District Director shall administrator, implement and enforce the provisions of this Title. Any powers granted to or duties imposed on the District Director may be delegated by the District Director to a duly authorized District employee.

ARTICLE II. WASTEWATER TREATMENT AND PRETREATMENT REGULATIONS

SECTION 1. Prohibitive Discharge Standards

A. No person shall discharge, cause to be discharged, or have any unapproved connection allowing or capable of allowing the discharge of any stormwater, foundation drainwater, groundwater, roof runoff, surface drainage, cooling waters, or any other unpolluted water to District sewer, nor shall any person use District trenches or bedding as a french drain for such discharge.
Amended: Ord. 01/02-O-04, 03-25-02

B. No IU shall discharge or cause to be discharged, directly or indirectly, any pollutant or wastewater which interferes with or passes through the POTW. IUs shall comply with applicable pretreatment standards and requirements whether or not they are subject to NCPS. The following general prohibitions shall apply to all IUs of District's POTW whether or not an IU is subject to NCPS or any other National, State or local pretreatment standards or requirements. An IU may not contribute the following substances to District's POTW:

1. Any liquids, solids or gases which, by reason of their nature or quantity, are, or may be, sufficient either alone or by interaction with other substances, to cause fire or explosion or be injurious or hazardous in any other way to the POTW or to the operation of the POTW. At no time shall the waste stream have a closed cup flash point of less than 140° Fahrenheit (60° Centigrade) using the Pensky-Martens Close Cup Test method. To be in compliance with this Section, the IU's discharge to District shall be less than the specific pollutant levels identified in Section 2B of this Article.

2. Any noxious, malodorous, or toxic liquids, gases, or solids which either singly or by interaction with other wastewaters are sufficient to create a public nuisance or hazard to life or are sufficient to prevent entry into sewers for their maintenance and repair.

3. Solid or viscous substances which may cause obstruction to the flow in a sewer or other interference with the operation of the wastewater treatment facilities.

4. Any wastewater having a pH less than 5.0 or greater than 11.0 units. Analysis for pH shall be based on individual grab samples that are analyzed within 15 minutes of collection. Alternatively, continuous monitoring devices may be used for measuring compliance with the pH limits. Any exceedance recorded by a continuous monitoring device is a violation of this Ordinance.
Amended 12-17-01

5. Any wastewater containing incompatible pollutants in sufficient quantity, either singly or by interaction with other pollutants, to injure or interfere with any wastewater treatment process, constitute a hazard to humans or animals,

create an incompatible effect in the receiving water of the POTW, exceed the limitation set forth in a NCPS (when effective), or in Section 2 of this Article, or create a public nuisance. An incompatible pollutant shall include, but not be limited to any pollutant identified pursuant to Section 307(a) of the Act.

6. In no case shall a substance discharged to the POTW cause the POTW to be in non-compliance with sludge use or disposal criteria, guidelines or regulations developed under Section 405 of the Act; any criteria guidelines or regulations affecting sludge use or disposal developed pursuant to the RCRA, SWDA, the Clean Water Act, the Toxic Substances Control Act, or State criteria applicable to the sludge management method being used.

7. Any substance which will cause the POTW to violate its NPDES Permit or the receiving water quality standards.

8. Any wastewater having a temperature at the point of discharge to the POTW which will inhibit biological activity in the POTW treatment plant resulting in interference; in no case shall wastewater be introduced to the POTW which exceeds 65°C (157°F) or which exceeds 40°C (104°F) at the POTW treatment plant.

9. Any pollutants, including compatible pollutants released at a flow or pollutant concentration which will cause interference to the POTW. In no case shall a slug measured at the point of discharge to the POTW have a flow rate or contain concentrations of pollutants that exceed more than five (5) times the average twenty-four (24)-hour concentrations, or twenty-four (24)-hour flow during normal operation; provided, however, that an IU subject to NCPS shall comply with such standards in addition to this Subsection B(9).

10. Any wastewater containing any radioactive wastes or isotopes of such half-life or concentration as may exceed limits established by State or Federal regulations.

11. Any wastewater which contains fats, oils and grease (FOG) or any other material that is extracted by freon, hexane, ether or other USEPA approved extraction solvent in the following concentrations:

    a. Polar FOG . . . . . 900 mg/l

    b. Non-polar FOG . . . . . 150 mpg/l

    Analysis for FOG shall be based on individual grab samples.

Amended 12-17-01

12. Any wastewater containing BOD, total solids, or suspended solids of such character and quantity that unusual attention or expense is required to handle such materials at the sewage treatment plant; provided however, that an IU may be permitted by specific, written agreement with the District, which

agreement to discharge such BOD or TSS may provide for special charges, payments or provisions for treating and testing equipment.

13. Hazardous waste shall not be discharged to the sanitary sewer system by truck, rail, or dedicated pipeline.

14. Any wastewater containing polychlorinated biphenyls (PCB)s, including without limitation PCB-1232, PCB-1260, PCB-1221, PCB-1248 and PCB-1016, as well as Arochlor 1242 (2) and Arochlor 1254 (2).

15. Any wastewater containing new or used antifreeze.

16. Any trucked or hauled pollutants, except at discharge points designated by the District.

Amended by Ordinance 08/09-O-03 Eff. 12/22/08

C. Additional Pretreatment Measures

a. Whenever deemed necessary, the District may require Users to restrict their discharge during peak flow periods, designate that certain wastewater be discharged only into specific sewers, relocate and/or consolidate points of discharge, separate sewage wastestreams from industrial wastestreams and such other conditions as may be necessary to protect the District and determine the User's compliance with the requirements of this Ordinance.

b. The District may require any person discharging into the POTW to install and maintain, on their property and at their expense, a suitable storage and flow-control facility to ensure equalization of flow. An individual or general wastewater discharge permit may be issued solely for flow equalization.

Amended by Ordinance 08/09-O-03 Eff. 12/22/08

c. The District may develop Best Management Practices (BMP's) to implement paragraphs B.1 – 17 of this Section. Such BMP's shall be considered local limits and Pretreatment Standards for the purposes of this ordinance.

Amended by Ordinance 10/11-O-05 Eff. 4/25/11

D. No person shall discharge medical waste. There shall be no discharge of any pharmaceutical medications, prescription or "over the counter", unused or expired, to the sewer.

Added by Ordinance 12/13-O-05, Eff. 7/24/2012

SECTION 2. Specific Limitations on Discharge

A. Discharges from each separate discharge of an IU as measured under the provisions of this Title, shall not contain in excess of the following daily maximum limits based upon a twenty-four (24)-hour composite sample, except for cyanide, which shall be based on a grab sample. Multiple industrial

wastewater discharges from an IU permitted facility may be combined in a flow weighted manner to determine compliance with the following limitations for a twenty-four (24) hour composite sample. Mass limits may be imposed as deemed necessary by the District. The following pollutant limits are established to protect the POTW treatment plant from pass-through, interference, or sludge contamination.

Cadmium, total ..... 1.3 mg/L
Chromium, total hexavalent, plus
Total trivalent ..... 12.0 mg/L
Chromium, total hexavalent ..... 8.0 mg/L
Copper, total ..... 0.8 mg/L
Cyanide, total by distillation ..... 1.7 mg/L
Nickel, total ..... 2 mg/L
Zinc, total ..... 4.6 mg/L
Lead, total ..... 2.5 mg/L
Arsenic ..... 0.6 mg/L
Selenium ..... 0.8 mg/L
Silver ..... 1.6 mg/L
Manganese ..... .50 mg/L
Molybdenum ..... 4.0 mg/L
Mercury ..... 0.4 mg/L

Amended by Ord. 95/96-O-04 eff. 12/18/95
Amended by Ord. 96/97-O-03 eff. 11/25/96
Amended by Ord. 12/13-O-02 eff. 6/1/2012

B. Wastewater from each separate discharge of an IU, as measured under the provisions of this Title shall not contain in excess of the following pollutant concentrations based upon an instantaneous grab sample. The following TROP limits are established to protect the POTW workers from toxic and reactive gases and vapors in the collection system or treatment plant. In cases where the listed maximum allowable concentration is less than the detection limit, and the sample result is also less than the detection limit, the user shall report "less than detection limit."

COMPOUND	LOCAL LIMIT (MG/L)
Benzene	0.014
Carbon Tetrachloride	0.011
Chlorobenzene	2.290
Chloroethane	5.880
Chloroform	0.060
Dichloroethane, 1.1.-	1.685
Dichloroethane, 1.2-	0.168
Dichloroethylene, 1.1-	0.016
Trans-Dichloroethylene, 1.2.-	2.040
Dichloropropane, 1.2	4.289
Ethylbenzene	1.659
Methyl Bromide	0.305
Methyl Chloride	0.557
Methylene Chloride	4.139
Tetrachloroethane, 1.1.2.2-	1.847
Tetrachloroethylene	0.945
Toluene	2.075
Trichloroethane, 1.1.2-	1.601
Trichloroethane, 1.1.1	2.759
Trichloroethylene	0.026
Vinyl Chloride	0.012

Amended by Ord. 96/97-O-05 EFF. 12/19/96
Amended by Ord. 01/02-O-03 EFF. 12/17/01
Amended by Ord. 03/04-O-02 Eff. 2/23/04

C. The District may develop Best Management Practices (BMPs) to implement Sections 1 and 2 of this Article. Such BMPs shall be considered local limits and Pretreatment Standards for the purposes of this Ordinance.

SECTION 3. Incorporation of National Categorical Pretreatment Standards

A. National Pretreatment Standards specifying quantities or concentrations of pollutants or pollutant properties which shall be discharged to the District by existing or new industrial sources in specific industrial subcategories will be established by separate regulations under the appropriate sub-part of 40 CFR Ch. I, Subchapter N and are hereby incorporated. These standards, unless specifically noted otherwise, shall be in addition to all applicable pretreatment standards and requirements set forth elsewhere in this Title. The District Director shall notify all known affected IUs of the applicable reporting requirements under 40 CFR, Sec. 403.12. Mass limits may be imposed as deemed necessary by the District.

B. Where a Categorical Pretreatment Standard is expressed only in terms of either the mass or the concentration of a pollutant in wastewater, the District may impose equivalent concentrations or mass limits in accordance with 40 CFR Sec. 403.6(c)(2).

C. When wastewater, subject to a new Categorical Pretreatment Standard is mixed with wastewater not regulated by the same standard, District shall impose an alternate limit using the combined wastestream formula found in 40 CFR Sec. 403.6(e).

D. A SIU may obtain a variance from a Categorical Pretreatment Standard if the SIU can prove, pursuant to the procedural and substantive provisions in 40 CFR Sec. 403.13, that factors relating to its discharge are fundamentally different from the factors considered by the USEPA when developing the Categorical Pretreatment Standard. Requests for this variance and supporting information shall be submitted to the Administrator of the USEPA, Region 5.

E. A SIU may obtain a net/gross adjustment to a Categorical Pretreatment Standard in accordance with 40 CFR Sec. 403.15.

F. When the limits in a Categorical Pretreatment Standard are expressed only in terms of pollutant concentrations, an IU may request that the District convert the limits to equivalent mass limits. The determination to convert concentration limits to mass limits is within the discretion of the District. The District may establish equivalent mass limits only if the IU meets all of the conditions found in 40 CFR 403.6(c)(5).

G. The District may convert the mass limits of the Categorical Pretreatment Standards of 40 CFR Parts 414, 419 and 455 to concentration limits for purposes of calculating limitations applicable to individual IU's under the following conditions: When converting such limits to concentration limits, the District shall use the concentrations listed in the applicable subparts of 40 CFR Parts 414, 419 and 455 and document that dilution is not being substituted for treatment as prohibited by Section 5 of this Article and in 40 CFR 403.6(d).

H. Equivalent limitations calculated in accordance with this Section are deemed Pretreatment Standards for the purposes of the CWA. The District shall document how equivalent limits were derived and make this information publicly available. Once incorporated into its wastewater discharge permit, the IU must comply with the equivalent limitations in lieu of the promulgated categorical standards from which the equivalent limitations were derived. [40 CFR 403.6(c) (7)]

I. Many Categorical Pretreatment Standards specify one limit for calculating maximum daily discharge limitations and a second limit for calculating maximum monthly average, or 4-day average limitations. Where such Standards are being applied, the same production or flow figure shall be used in calculating both the average and maximum equivalent limitation. [40 CFR 403.6(c)(8)]

J. Any SIU operating under a permit incorporating equivalent mass or concentration limits calculated from a production-based Standard shall notify the District within two (2) business days after the SIU has a reasonable basis to know that the production level will significantly change within the next calendar month. Any IU not notifying the District of such anticipated change will be required to meet the mass or concentration limits in its permit that were based on the original estimate of the long term average production rate. [40 CFR 403.6(c)(9)]

SECTION 4. District's Right of Revision

The District reserves the right to establish, by ordinance, or in individual or general wastewater discharge permits, more stringent standards or requirements on discharges to the District consistent with the purpose of this Title. The specific limitations on discharge listed in Section 2 are derived from the Maximum Allowable Industrial Loading (MAIL). The MAILs are allocated only to those IUs, at the District's discretion, that contribute the regulated pollutant and all remaining IUs are held to either the background concentration or slightly higher than background but lower than the specific discharge limit. In no case shall all allocations exceed the MAIL.

SECTION 5. Excessive Discharge

No IU shall increase the use of process water or, in any way, attempt to dilute a discharge as a partial or complete substitute for adequate pretreatment to achieve compliance with the limitations contained in the NCPS (when effective), or in any other pollutant-specific limitation developed by the District or State.

SECTION 6. Variances

A. Variances to permit conditions or to other provisions of Title 2 shall only be issued by the Board, and then in accordance with the Appeal Procedure set forth in Title 7, Article I, Section 5.

Amended by Ord. 03/04-O-02 Eff. 2-23-04

B. In no case shall the Board grant any variance whose terms might or could cause interference or pass through the POTW or cause the violation of an applicable pretreatment standard, as such terms are defined in this Title.

C. In granting a variance, the Board may impose such conditions, exceptions, time limitations, duration and other limitations as the policies of this Title, the IEPA and the Act may require. Except as otherwise provided, any variance granted by the Board shall not exceed five (5) years and shall be granted upon the condition that the person who receives such variance shall make such periodic progress reports as the Board shall specify. Such variance may be extended from year to year by affirmative action of the Board, but only if satisfactory progress has been shown.

D. Any person seeking a variance shall do so by filing a Petition for Variance with the District Director on forms provided by the District. District shall specify information required to be submitted by the petitioner.

E. To enable the District to rule on the Petition for Variance, the following information, where applicable, shall be included in the petition:

1. A clear and complete statement of the precise extent of the relief sought, including specific identification of the particular provisions of the Title from which the variance is sought.

2. Data describing the nature and extent of the present failure to meet the particular provisions from which the variance is sought and a factual statement why compliance with this Title was not or cannot be achieved.

3. A detailed description of the existing and proposed equipment or proposed method of control to be undertaken to achieve full compliance with this Title, including a time schedule for the implementation of all phases of the control program, from initiation of design to program completion, and the estimated costs involved for each phase, and the total cost to achieve compliance.

4. Past efforts to achieve compliance, including costs incurred, results achieved and permit status.

5. A discussion of the availability of alternate methods of compliance, the extent that such methods were studied, and the comparative factors leading to the selection of the control program proposed to achieve compliance.

6. A concise factual statement of the reasons the petitioner believes that compliance with the particular provisions of this Title would impose an arbitrary or unreasonable hardship.

7. Such other information as required by the District.

F. Unless the variance arises as a result of the District Director's action, the District Director shall investigate such petition, consider the views of persons who might be adversely affected by the granting of a variance and make a report to the Board of the disposition of the petition. If the Board, in its discretion, concludes that a hearing would be advisable or if the District Director or any other person files a written objection to the granting of such variance within fifteen (15) days of the rendering of the report, then a hearing shall be held under the provisions of Title 7, Article I, Section 4C of this Code, and the burden of proof shall be on the petitioner. If the petition arises as a result of the District Director's action, the complete District file, together with the petition, shall be forwarded to the Board in accordance with the provisions of Title 7, Section 5.

G. If the Board fails to take final action upon a variance request within sixty (60) days after the filing of a petition, the petitioner may deem the petition granted under this Article for a period not to exceed one (1) year. However, the period of sixty (60) days shall not run for any such period of time during which the Board is without sufficient membership to constitute a quorum as set forth in the enabling legislation for the District.

H. If any terms of a variance are violated by the person granted a variance, a violation of this Code is deemed to have occurred and the variance may be revoked on thirty (30) days notice.

SECTION 7. Spill Containment and Slug Discharges

A. Spill Containment

1. Accidental Discharges

Each IU having the ability to cause interference with the POTW treatment plant or to violate the regulatory provisions of this Title shall provide protection from accidental discharge to the POTW of prohibited materials or other substances regulated by this Title. Facilities to prevent accidental discharge of prohibited materials shall be provided and maintained at the owner or IU's own cost and expense. All SIUs whose wastewater includes, or could include, compatible or incompatible pollutants in amounts great enough to cause interference with the POTW must have detailed plans on file at the District showing facilities and operating procedures to provide this protection. Plans shall be approved by the District before construction of any new facility. No IU who begins contributing to, or could contribute such pollutants to, the POTW after the effective date of this Title shall be permitted to introduce such pollutants into the system until accidental discharge facilities and procedures, as appropriate, have been approved by the District and installed by the IU. Review and approval of such plans and operating procedures shall not relieve the IU from the responsibility to modify its facility as necessary to meet the requirements of this Title.

2. Immediate Notification

In the case of an accidental or deliberate discharge of compatible or incompatible pollutants which is a slug or which otherwise causes or may cause interference at the POTW or violate regulatory requirements of this Title, it shall be the responsibility of the IU to immediately telephone and notify the District of the incident. The notification shall include name of caller, location and time of discharge, type of wastewater, concentration and volume.

3. Written Report

Within five (5) days following such an accidental or deliberate discharge, the IU shall submit to the District Director a detailed written report describing the cause of the discharge and the measures to be taken by the IU to prevent similar future occurrences. Follow up reports may be required by District as needed. Such report, or reports, shall not relieve the IU of any expense, loss, damage or other liability which may be incurred as a result of damage to the POTW, fish kills, or any other damage to person or property; nor shall such report relieve the IU of any fines, civil or criminal penalties, or other liability which may be imposed by this Title or otherwise. Failure to report accidental or deliberate discharges may, in addition to any other remedies available to District, result in the revocation of the discharger's WDP.

4. A notice in English and the language of common use shall be permanently posted on the IU's bulletin board or other prominent place advising employees whom to call in the event of a discharge of a prohibitive material. Employers shall insure that all employees who are in a position to cause, discover, or observe such an accidental discharge are advised of the emergency notification procedures.

5. Additional Remedies

In addition to remedies available to District set forth elsewhere in this Title, if the Rock River Water Reclamation District is fined by the IEPA or USEPA for violation of the District's NPDES Permit or violation of Water Quality Standards as the result of an industrial spill or intentional slug discharge of a compatible or incompatible pollutant, then the fine, including all District legal, sampling, analytical testing costs and any other related costs shall be charged to the responsible industry. Such charge shall be in addition to, and not in lieu of, any other remedies District may have under this Title, statutes, regulations at law or in equity.

B. Slug Discharges

1. District shall review slug discharges received from SIUs and determine which, if any, SIUs need a plan or other action to control slug discharges to supplement any plan for control of spills previously submitted to District. For IUs identified as significant prior to November 14, 2005, this evaluation must have been conducted at least once by October 14, 2006; additional SIUs must be evaluated within one (1) year of being designated as a SIU. If a Slug Control Plan (SCP) is required, District will notify the user in writing and require submission of a plan within sixty (60) days of the date notification is sent. The plan shall contain as a minimum:

   a. description of the user's discharge practices including non-routine batch discharges.

   b. description of stored chemicals.

   c. the user's procedures for immediately notifying the District of slug discharges, including any discharge that would violate the prohibitive discharge standards found in Section 1B of this Article.

   d. if required, procedures to prevent adverse impact on District from accidental spills, including inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site runoff, worker training, building of containment structures or equipment, measures for containing toxic organic pollutants (including solvents) and necessary measures and equipment for emergency response.

   To the extent part or all of the information specified in subparagraphs a. through d. above has been previously submitted, copies of such previous submissions may be attached as exhibits to the SCP and referred to in the plan.

   District will review the plan and if it is unsatisfactory, require the user to make necessary corrections and resubmit it. Failure to submit an SCP or to make required corrections shall be a violation of Title 2 of this Code and of District's Enforcement Management System.

2. Any IU required to submit a written SCP to the District shall be required to comply with all conditions contained within that plan. Compliance will be determined by periodic District inspections of the facility.

3. Significant Industrial Users are required to notify the District immediately of any changes at its facility affecting the potential for a Slug Discharge.

SECTION 8. Separators

A. The user of any property serviced by a sanitary sewer shall install separators as necessary for the proper handling of liquid wastes containing grease, sand, oil or any other matters that may violate the provisions of Section 1 of this Article. Such separators shall be installed by the user and be accessible for maintenance purposes. It shall be the user's responsibility to clean and maintain such separator or separators at a regular frequency so as to ensure efficient operation.

1. Grease Interceptor

Any new or altered food service establishment that introduces fats, oil, or grease (FOG) into the drainage and sewage system in quantities large enough to cause line blockages or hinder sewage treatment, shall install a minimum capacity of 1,000 gallons interceptor located outside the building. Any existing food service establishment that has been found to contribute fats, oil, or grease in quantities sufficient to cause line blockages resulting in sanitary sewer overflows, or necessitating increased maintenance in the collection system, shall install a minimum capacity of 1,000 gallons interceptor located outside the building.

2. Grease Traps

Small volume food service establishments, which have limited menus, minimum dishwashing, and/or minimal seating, shall provide a grease trap built into the wastewater piping located a short distance from the grease producing fixture(s). The location and capacity of the grease trap(s) shall be approved by the Plant Operations Manager.

3. Cleaning Frequency

Grease interceptors shall be pumped out completely at a minimum frequency of once every ninety (90) days, or more frequently as needed to prevent carry over of oil and grease into the collection system. Under-the-sink grease traps shall be cleaned at a minimum frequency of once per week, or more often, as necessary, to prevent pass through of grease and other food solids to the collection system. Cleaning and maintenance shall include removal of materials from the tank walls, baffles, cross pipes, inlets and outlets. At no time shall the combined measured level of solids and grease layer exceed 25% of the holding capacity of the interceptor.

Amended by Ordinance 10/11-O-05 Eff. 4/25/2011

4. Record Keeping

No person shall allow the transportation or acceptance of grease trap waste for rendering, storage, treatment, or disposal away from the site where the waste was generated, unless the grease trap waste is accompanied by a shipping paper containing, at a minimum, the following information:

a. The name, address, and telephone number of the generator of the grease trap waste, the street address of the grease trap or interceptor, the volume of grease trap waste removed, the legible signature of an authorized representative of the generator, and the date of the grease trap waste removal.

b. The name, address, and telephone number of the grease trap waste transporter, acknowledgement of the receipt of the waste, the legible signature of an authorized representative of the transporter, and the date of the grease trap waste collection.

c. The name, address, and telephone number of the facility receiving the grease trap waste, an acknowledgement of such receipt, the legible signature of an authorized representative of the receiving facility, and a date of receipt.

The grease trap waste generator, transporter, and management facility shall each retain a copy of the shipping paper for a minimum of two years. These documents shall be produced upon request of District representatives, or representatives of the Illinois Environmental Protection Agency.

Amended By Ord. 01/02-O-03 Eff. 12-17-01

When grease traps are cleaned in-house by the grease trap waste generator, a log shall be kept of such cleaning(s). These logs shall be retained for a minimum of two years and shall be produced upon request of District representatives or representatives of the Illinois Environmental Protection Agency.

Amended by Ordinance 10/11-O-05 Eff. 4/25/2011

5. Multiple Tenant Commercial (Strip Malls)

Each multiple tenant commercial building shall have a common kitchen grease waste drain sized to collect future potential flows from fixtures that can be expected to introduce fats, oils or grease from food preparation and/or dishwashing into the sanitary sewer system. These fixtures shall include, but are not limited to, utensil, vat, dish, or floor cleaning and other fixtures of these types. The common kitchen grease waste drain shall be routed to the exterior of the building to a grease interceptor. Sanitary sewage flows will not be allowed into the kitchen grease waste drain.

The grease interceptor shall be constructed in accordance with all applicable local and state plumbing codes. The grease interceptor shall be vented and access covers shall be gas tight with an opening dimension of a minimum of 24".

Sizing criteria for the common grease interceptor will be as follows:

The number of potential seats in any strip mall shall be determined by dividing 25% of the interior building square footage by the occupant load factor (15 SF/person).

$$\frac{.25 \times \text{Total Building Square Footage}}{15} = \text{Potential Restaurant Seating}$$

To size the common grease interceptor, the following formula shall be used:
Seats x 6 (Waste Flow Rate) x 2.5 (Retention Time) x Storage Factor
The storage factor is as follows:

Hours of Operation	Storage Factor
8	1
16	2
24	3

In no case will any grease interceptor for a strip mall be less than 1,500 gallons.

Any establishment which will produce an overload on this design will be required to make any necessary corrections/alterations to assure compliance with the District Code of Ordinances.

Amended by Ord. 08/09-O-02 eff. 10-1-08

In lieu of the common grease line and interceptor as described above, the multiple tenant building owner may provide for the installation of an individual grease line and interceptor for each tenant space with food service, and discharge the combined treated kitchen waste and domestic waste flows of all the tenant spaces to the District. The grease interceptor shall be sized pursuant to the provisions of this Section. The combined discharges are subject to all other requirements of the District Code of Ordinances and standard District procedures for service connection permits. If this option is chosen, prior to issuance of the building connection permit, the owner shall demonstrate on drawings the method and space allocated for providing the necessary grease line and interceptor to all tenant spaces.

The owner of a multiple tenant building (strip mall) shall inform any future tenant which engages in food preparation of the grease line and interceptor requirement and shall inform the District in advance in writing of any change in tenant use to a food preparation use. Failure by the Owner to inform the District of a change in use of a tenant space requiring pretreatment is considered a violation of the District Code of Ordinances and can result in

the disconnection of the discharge and a fine up to $1,000 per day of violation under Title 8, Article I and Article II.

Amended 6-28-2010, Ord. 10/11-O-01

B. The construction of separators shall be in strict accordance with applicable State and local plumbing codes.

C. No person shall intentionally reintroduce into the sewer system of the District, materials which have been removed from the sewer system by catch basins, grease traps and other separator devices. Physical, chemical or biological agents shall not be introduced into catch basins, grease traps or other separator devices for the purpose of re-suspending, dissolving, emulsifying, or rendering soluble any pollutant or other materials removed from a waste stream by such pretreatment devices and reintroducing these materials into the sewer system.

SECTION 9. Wastewater Haulers

A. Wastewater haulers shall discharge all wastes at locations designated by the Plant Operations Manager.

B. Permits

1. Wastewater Hauler permits shall be issued by the District Director after the permittee submits such information, as the District Director will require.

2. Each wastewater hauling vehicle shall have a valid discharge permit issued by the District Director before discharging waste at the District. Each permitted wastewater hauling vehicle shall prominently display a number issued by the District Director on the driver's side of the tank on that vehicle. Such numbers shall be removable only by destruction. Decals for this purpose will be provided by the District Director after receipt of payment by the wastewater hauler.

3. Wastewater haulers discharging waste at the District, under the IEPA Non-Hazardous Special Waste Hauling Permit, shall have a valid wastewater hauler permit.

4. Any wastewater haulers not discharging waste at the District for a period of twelve (12) consecutive months shall have its wastewater hauler permit canceled by the District Director. Should the wastewater hauler wish to keep the wastewater hauler permit active, a renewal fee to be set by the Board must be submitted to the District within thirty (30) days after receiving notice of cancellation.

C. Each wastewater hauling vehicle shall be equipped with quick disconnecting couplers.

D. Representative samples of wastewater from a discharge by a wastewater hauler shall comply with the provisions of Sections 1 and 2 of this Article.

E. Each load delivered to the wastewater treatment plant must have a wastewater hauler manifest properly filled out by the wastewater hauler as necessary and signed by the scale operator on duty.

F. Each load of wastewater delivered to the wastewater treatment plant under a Non-Hazardous Waste Hauler Permit granted by the IEPA must have a wastewater hauler manifest and an Illinois Uniform Hazardous Waste Manifest properly completed and signed by the generator and wastewater hauler. Both manifests must also be signed by the scale operator on duty. The District will keep copies of both manifests.

G. All procedures for discharging, for cleanliness and for general sanitary operation on District property as prescribed by the District shall be strictly adhered to.

H. The source or sources of all liquid wastes being hauled to the POTW treatment plant shall be properly documented using the District's manifest system.

I. Wastewater from a domestic level user shall not be mixed with wastewater from an IU. Vehicles hauling wastewater from an IU shall not be used to haul wastewater from a domestic level user for disposal at the POTW.

J. In addition to remedies available to District set forth elsewhere in this Code, failure of a wastewater hauler to comply with the provisions of this Section shall be grounds for revocation of the hauler's discharge permit by the District Director.

K. The annual maintenance fee for the wastewater hauler discharge permit shall be set by the Board of Trustees. A new application must be submitted for approval every three years.

SECTION 10. Wastewaters From CERCLA Remedial Actions

Treated wastewaters as a result of remedial actions required by CERCLA or other applicable regulations within the boundaries of the Rock River Water Reclamation District may be discharged into the private sanitary sewer system of the IU. The following conditions apply to such discharges:

A. The treated wastewater must be discharged from a wastewater treatment facility with a valid construction and/or operation permit from the IEPA.

B. The IU must have a valid WDP for the location from which the treated wastewater is being discharged into the private sanitary sewer system of the IU. If the location is not currently permitted, the IU must apply for and receive a WDP.

C. The WDP for the IU's facility shall be modified and subject to limitations and conditions that may be imposed by the Board on the treated wastewater from the

remedial action site. The Board may impose stricter restrictions on discharge than are provided in Federal or State regulations.

D. IUs shall furnish the District a letter from the IEPA certifying that the wastewater is not classified as a hazardous waste as defined by RCRA.

SECTION 11. Discharge of Hazardous Waste

A. Each IU shall notify the District, the EPA Regional Waste Management Division Director and the Manager, IEPA, in writing, of any discharge into District's POTW of a substance which, if otherwise disposed of, would be a hazardous waste under 40 CFR Part 261.

B. The notification to be given pursuant to Section 11A of this Article, shall include:
Amended by Ord. 03/04-O-02 Eff. 2-23/04

1. Name of the hazardous waste,

2. EPA hazardous waste number,

3. Type of discharge (continuous, batch or other).

C. If the IU discharges more than 100 kilograms (220 lbs.) of any identified waste per calendar month to District's POTW, notification shall contain the following additional information:

1. Identification of hazardous constituents contained in the wastes,

2. Estimate of the mass and concentration of such constituents and the waste stream discharged during the calendar month.

3. Estimation of the mass of constituents in the waste stream expected to be discharged during the succeeding twelve (12) months.

4. Notification under this paragraph need be submitted only once for each hazardous waste discharged. Any changes to the discharge must be submitted to District in accordance with their WDPs. If pollutants have previously been reported under self-monitoring under the user's self-monitoring requirements, they need not be re-submitted.

D. An IU need not notify the agencies set forth in Section 11A for any calendar month in which it discharges no more than a total of fifteen (15) kilograms (33 pounds) if non-acute hazardous wastes. Notification is required if any quantity of acute hazardous waste, as specified in 40 CFR Sec. 261.30(d) and 261.33(e) is discharged.

E. In case any new Federal or State regulations which identify additional characteristics of hazardous waste or list additional substances as a hazardous waste are issued, an affected IU must notify the District, the EPA Regional Waste Management Waste Division Director and the Manager of the IEPA of the discharge of such substance within ninety (90) days of the effective date of such regulations.

F. For each notification made under this section, the user shall certify that it has a program in place to reduce the volume and toxicity of hazardous waste generated to the degree it has determined to be economically practical.

SECTION 12. Denial or Conditioning of New or Increased Contribution

The District shall deny or condition new or increased contribution of pollutants to its treatment works by IUs, where such contributions do not meet applicable pretreatment standards and requirements or where such contributions would cause the District to violate its NPDES permit.

Any IU which adds to or significantly increases the discharge loading of any regulated pollutant shall notify the District of this change in condition prior to such discharge. Upon receipt of such notification, District shall: 1) Determine the IU's compliance with the applicable pretreatment standard, and 2) Review the applicable local limit for possible revision in light of the increased loadings.

SECTION 13. Affirmative Defense

An IU shall have an affirmative defense to an enforcement action brought against it for noncompliance with the prohibitive discharge standards in Section 1A or Section 1B, of this Article if it can prove that it did not know, or have reason to know, that it's discharge, alone or in conjunction with discharges from other sources, would cause pass-through or interference, and that either:

Amended by Ord. 03/04-O-02 Eff. 2-23/04

A. A local limit exists for each pollutant discharged and the IU is in compliance with each limit directly prior to and during the pass through or interference; or

B. No local limit exists, but the discharge did not change substantially in nature or constituents from the IU's prior discharge when the District was regularly in compliance with its NPDES permit, and in the case of interference, was in compliance with applicable sludge use or disposal requirements.

ARTICLE III. DISCHARGE PERMITS

SECTION 1. Requirement for Discharge Permits

A. SIUs to Have Permits.

It shall be unlawful for any SIU to discharge wastewater to the District without an individual discharge permit issued by the District in accordance with the provisions of this Code. At the discretion of the District, SIUs may be controlled through the use of general permits. Facilities covered by general permits shall meet all the criteria given in 40 CFR 403.8(f)(1)(iii).

B. Determination that an IU is Not a SIU.

If an IU, other than a CIU, meets any of the criteria set forth in Article II, Section 77 of Title 1, but has no reasonable potential for adversely affecting District operations or for violating any pretreatment standard or requirement, District may determine that such IU is not a SIU. District may make such determination on its own initiative or in response to a petition from the IU.

Amended by Ord. 03/04-O-02 Eff. 2-23/04

C. Food Service Establishment Permits

Ord. 04/05-O-04, Effective 03-01-2005

1. General food service establishment permits shall be issued by the District to those establishments required to install separators as set forth in Article II, Section 8.

2. Any food service establishment required to obtain a general permit shall complete and file with the District an Industrial Wastewater Discharge Permit Application as set forth in Section 2.B. of this Article.

D. IUs to Have Permits

Ord. 08/09-O-04, Effective 02-24-2009

Permits may be issued to an IU that does not meet the definition of a SIU but have processes that could potentially have an adverse affect on the District's operations. Non-Significant Categorical Industrial User (NCSIU) Permits shall be issued to an IU meeting the definition of a NSCIU as found in Title 1, Article II, Section 77. Zero Regulated Wastewater Discharge Permits shall be issued to an IU that conducts processes that are subject to a National Categorical Pretreatment Standard (NCPS) but have no discharge from these processes.

SECTION 2. Permits

A. Discharge Permits

All SIUs proposing to connect to or to contribute to the POTW shall obtain a WDP before connecting to or contributing to the POTW.

B. Industrial Wastewater Discharge Permit (WDP) Application

An IU required to obtain a WDP shall complete and file with the District, an application in a form to be prescribed and furnished by the District, and accompanied by a fee to be determined by the Board.

The District Plant Operations Manager will evaluate the data furnished by the IU and may require additional information within ninety (90) days of submission by the IU. After evaluation and acceptance of the data furnished, the District Director shall issue a WDP subject to terms and conditions provided herein. IUs submitting information required in this Section shall not be deemed to have a permit until the District Director issues such a permit under the provisions of Section 2A of this Article. Permits shall be deemed issued one hundred eighty (180) days after application has been made if there have been no additional requests for information by the District Director, or two hundred seventy (270) days after application has been made if there have been additional requests for information by the District Director. Existing IUs submitting timely information in accordance with this Article shall not be subject to enforcement actions based on their failure to have a wastewater discharge permit during the one hundred eighty (180) day period set forth herein or during any extension of time allowed by this Section.

C. Additional Information Required From IUs Subject to NCPS.

Within one hundred eighty (180) days after the effective date of a NCPS, or one hundred eighty (180) days after a final administrative decision has been made upon a categorical determination submission in accordance with Section 403.6 (a)(4) of the General Pretreatment Regulations, whichever is later, existing IUs, subject to such NCPS and currently discharging to the District's POTW, shall apply for a WDP.

New sources, when subject to a NCPS, shall apply for a WDP at least ninety (90) days prior to discharging to the POTW.

The District will evaluate the data furnished by the IU and may require additional information within ninety (90) days of submission by the IU. After evaluation and acceptance of the data furnished, the District shall issue a WDP or modify an existing WDP prior to the compliance date for the applicable NCPS.

D. Permit Modifications

1. WDPs issued to an IU will be supplemented by the incorporation of NCPS when an IU has manufacturing processes regulated by such standards. This modification will include the limits on average and daily maximum pollutant concentrations from the applicable NCPS.

2. Where the NCPS are modified by the combined waste stream formula (Section 403.6(e) of the General Pretreatment Regulations), or a Fundamentally Different Factors Variance (Section 403.13 of the General

Pretreatment Regulations), the limits as modified shall be made a part of the WDP.

3. Where an IU has manufacturing processes which are regulated by more than one NCPS at the same permitted discharge location, the limitation in the WDP shall be adjusted consistent with USEPA guidelines and regulations.

E. Permit Conditions

Discharge permits shall be expressly subject to all provisions of this Title and all other applicable regulations, IU charges, and fees established by the Board.

F. Change in Conditions

1. Each IU shall promptly notify the District Plant Operations Manager in advance of any substantial change in the volume or character of pollutants in their discharge.

   a. The District Plant Operations Manager may require the IU to submit such additional information as may be deemed necessary to evaluate the changed condition, including the submission of a WDP application pursuant to Section 2B of this Article.

   b. For purposes of this requirement, significant changes include, but are not limited to, flow increases of twenty per cent (20%) or greater and the discharge of any previously unreported pollutants.

G. Duration

Permits shall be issued for a specified time period, not to exceed five (5) years. The District Plant Operations Manager shall notify an IU two hundred ten (210) days prior to expiration of the user's permit. Within ninety (90) days of notification, the user shall apply, on a form provided by the District, for reissuance of the permit. The terms and conditions of the permit may be subject to modification by the District Director during the term of the permit as limitations or requirements as identified in Article II, Section 2 of this Title are modified or other just cause exists. The IU shall be informed of any proposed changes in his permit at least thirty (30) days prior to the effective date of change. Where any changes are made in an IU's permit, a reasonable time, as determined by the District Director, shall be given to achieve compliance. The Board may establish a fee to be charged IUs that are applying for reissuance of their permits.

H. Transfer

WDPs are issued to a specific IU for the process activity specified in the permit. A WDP shall not be assigned, transferred or sold to a new owner or new IU in different premises or to a new or changed operation in the same or different premises without

the approval of the District Director. If the premises are sold or otherwise transferred by the permittee to a new owner who will maintain the operation in the same premises, then the permit held by the seller shall be reissued by the District Director to the new owner as a temporary permit; provided that the new owner shall immediately apply for a new permit in accordance with this Title and further provided that the temporary permit shall only be effective for ninety (90) days after the date of sale or transfer. District shall have the same remedies for violation of temporary permits as it has for violation of other discharge permits.

I. Applicable Limits

WDPs shall contain discharge limits, including Best Management Practices, based on applicable general Pretreatment Standards, categorical Pretreatment Standards, local limits, and State and local law.

J. Self-Monitoring, Sampling, Reporting, Notification and Record Keeping.

WDPs shall contain self-monitoring, sampling, reporting, notification and record keeping requirements. These requirements shall include, without limitation, an identification of pollutants to be monitored, (including the process for seeking a waiver for a pollutant neither present nor expected to be present in the discharge in accordance with Section 3D of this Article, or a specific waived pollutant) the sampling location, sampling frequency and sample type based on Federal, State and local law.

K. Civil and Criminal Penalties

WDPs shall contain a statement of applicable civil and criminal penalties for violation of pretreatment standards and requirements and any applicable compliance schedule. Such schedule may not extend the compliance date beyond applicable Federal deadlines.

L. Permit Addendum

An addendum to IUs WDP may be issued by the District Director at any time to incorporate such additional enforcement measures, including, but not limited to, compliance directives, compliance schedules, and interim discharge limits. Interim limits are described in Title 7, Article I, Section 3D of this Code.

These additional enforcement measures shall be established pursuant to the procedures outlined in Title 7 of this Code and the District's Enforcement Management System/Enforcement Response Guide (EMS/ERG).

M. Permit Revocation

The District may revoke an individual or general wastewater discharge permit for good cause, including, but not limited to, the following reasons:

1. Failure to notify the District of significant changes to the wastewater prior to the changed discharge;

2. Failure to provide prior notification to the District of changed conditions pursuant to Section 2F of this Article;

3. Misrepresentation or failure to fully disclose all relevant facts in the wastewater discharge permit application;

4. Falsifying self-monitoring reports and certification statements;

5. Tampering with monitoring equipment;

6. Refusing to allow the District timely access to the facility premises and records;

7. Failure to meet effluent limitations;

8. Failure to pay fines/penalties;

9. Failure to pay sewer charges;

10. Failure to meet compliance schedules;

11. Failure to complete a wastewater survey or the wastewater discharge permit application;

12. Failure to provide advance notice of transfer of business ownership of a permitted facility; or

13. Violation of any Pretreatment Standard or Requirement, or any terms of the wastewater discharge permit or this Title.

Individual or general wastewater discharge permits shall be voidable upon cessation of operations or transfer of business ownership. All individual or general wastewater discharge permits issued to an IU are void upon issuance of a new individual or general wastewater discharge permit to the IU.

SECTION 3. Reporting Requirements for Permittee

A. Baseline Monitoring Report (BMR)

Within either one hundred eighty (180) days after the effective date of the Categorical Pretreatment Standard, or the final administrative decision on a categorical determination under 40 CFR Sec. 403.6(a)(4), whichever is later, existing categorical users currently discharging or scheduled to discharge to the District shall submit to the District Plant Operations_Manager a report that contains the information listed in Subparagraphs 1 - 8 below. At least ninety (90) days prior to the commencement of discharge, new sources, and sources that become categorical users subsequent to the promulgation of an applicable categorical standard shall submit to the District Plant Operations Manager a report which contains the information listed in Subparagraphs 1 - 8 below. A New Source shall report the method of pretreatment it intends to use to meet applicable categorical standards. A New Source shall give estimates of its anticipated flow and quantity of pollutants to be discharged.

IUs described above shall submit the following information:

1. Identifying Information. The name and address of the facility, including the name of the operator and owner(s);

2. Permits. A list of any environmental control permits held by or for the facility;

3. Descriptions of Operations. A brief description of the nature, average rate of production, and Standard Industrial Classification (SIC), of the operation(s) carried out by such IU. This description shall include a schematic process diagram which indicates points of discharge to the District from the regulated process.

4. Flow Measurement. Information showing the measured average daily and maximum daily flow, in gallons per day, to District from regulated process streams and other streams as necessary, to allow use of the combined waste stream formula as set forth in Article II, Section 3C of this Title.

5. Measurement of Pollutants

    a. The Categorical Pretreatment Standards applicable to each regulated process.

    b. The results of sampling and analysis identifying the nature and concentration, and/or mass, where required by the Standard or by the District, of regulated pollutants in the discharge from each regulated process. Instantaneous, daily maximum and long-term average concentrations, or mass, where required, shall be reported. The sample shall be representative of daily operations and shall be analyzed in accordance with procedures set out in Section 3C(4) of this Article.

c. Instantaneous, daily maximum and long-term average concentrations, or mass, where required, shall be reported;

d. The sample shall be representative of daily operations and shall be analyzed in accordance with procedures set out in Section 3C(4) of this Article. In cases where the Pretreatment Standard requires compliance with a Best Management Practice (BMP) or pollution prevention alternative, the IU shall submit documentation as required by the District or the applicable standards to determine the compliance of the IU;

e. The IU shall take a minimum of one representative sample to compile the data necessary to comply with the requirements of this paragraph;

f. Samples should be taken immediately downstream from pretreatment facilities if such exist or immediately downstream from the regulated process of no pretreatment exists. If other wastewaters are mixed with the regulated wastewater prior to pretreatment, the IU should measure the flows and concentrations necessary to allow use of the combined wastestream formula in 40 CFR 403.6(e) to evaluate compliance with the Pretreatment Standards. Where an alternate concentration or mass limit has been calculated in accordance with 40 CFR 403.6(e) this adjusted limit along with supporting data shall be submitted to the District;

g. Sampling and analysis shall be performed in accordance with Section 3C(4) of this Article;

h. The District may allow the submission of a baseline report which utilizes only historical data or so long as the data provides information sufficient to determine the need for industrial pretreatment measures;

i. The baseline report shall indicate the time, date and place of sampling and methods of analysis, and shall certify that such sampling and analysis is representative of normal work cycles and expected pollutant Discharges to the POTW.

6. Compliance Certification. A statement, reviewed by the IU's authorized representative and certified by a qualified professional, indicating whether pretreatment standards are being met on a consistent basis, and, if not, whether additional operation and maintenance (O & M) and/or additional pretreatment is required to meet the pretreatment standard and requirements.

7. Compliance Schedule. If additional pretreatment and/or O & M will be required to meet the pretreatment standards, the shortest schedule by which the IU will provide such additional pretreatment and/or O & M. The completion date in this schedule shall not be later than the compliance date established for the applicable Pretreatment Standards. A compliance schedule of this Section must meet the requirements as set forth in Article III, Section 3.E. of this Title.

8. Signature and Report Certification. All BMRs must be signed and certified in accordance with Section 3F of this Article and signed by an Authorized Representative as defined in Title 1 of the District's Code of Ordinances.

B. Ninety (90) Day Compliance Report.

Within ninety (90) days following the date for final compliance with applicable pretreatment standards, or in the case of a New Source, following commencement of the introduction of wastewater into the POTW, any IU subject to pretreatment standards and requirements shall submit to the District Plant Operations Manager a report, on forms provided by the District Plant Operations Manager, indicating the nature and concentration of all pollutants in the discharge from the regulated process which are limited by pretreatment standards and requirements and the average and maximum daily flow for these process units in the IU facility which are limited by such pretreatment standards or requirements. The report shall state whether the applicable pretreatment standards or requirements are being met on a consistent basis and, if not, what additional IU O & M or pretreatment techniques or installations are necessary to bring the IU into compliance with the applicable pretreatment standards or requirements. This statement shall be signed by an authorized representative of the IU, and certified by a qualified professional as defined in General Pretreatment Regulations. For IUs subject to equivalent mass or concentration limits established by the District Plant Operations Manager in accordance with the procedures in Article II, Sec. 3B of this Title, this report shall contain a reasonable measure of the user's long-term production rate. Where the District performs the required sampling and analysis in lieu of the IU, the user will not be required to submit the compliance certificate required in this Subparagraph.

C. Periodic Compliance Reports

1. All SIUs are required to submit periodic reports under the provisions of this Section. Any IU subject to an applicable pretreatment standard, after the compliance date of such applicable pretreatment standard or, in the case of a New Source, after discharge of wastewater to the POTW begins, shall submit to the District Plant Operations Manager on or before the 20th day of the months of July and January (or on the date specified in the SIU's Wastewater Discharge Permit), a certified report on forms provided by the District Plant Operations Manager indicating the nature and concentration, or production and mass where required by the District Plant Operations Manager, of

pollutants in the discharge which are limited by such applicable pretreatment standards. The report shall include a record of all measured or estimated average and maximum daily flows for the reporting period . In cases where the Pretreatment Standard requires compliance with a Best Management Practice (BMP) or pollution prevention alternative, the SIU must submit documentation required by the District to determine the compliance status of the SIU.

2. At the discretion of the District Plant Operations Manager, this report may also include concentrations of BOD/COD/TSS or other pollutants specified by the District Plant Operations Manager. Permittee shall sample and analyze its wastewater for BOD/COD/TSS or other pollutants at the discretion of the District Plant Operations Manager as set forth in the permit issued to permittee.

3. At the discretion of the District Director and in consideration of such factors as a local high or low flow rate, holidays, budget cycles, the Plant Operations Manager may agree to alter the months during which the above reports are submitted.

4. All measurements, tests, and analyses of the characteristics of wastewater to which reference is made in Sections 3A, 3B and 3C of this Article, shall be determined in accordance with 40 CFR Section 136. The Plant Operations Manager shall require the frequency of monitoring necessary to assess and assure compliance by SIUs with applicable Pretreatment Standards requirements.

Amended by Ord. 03/04-O-02 Eff. 2-23/04

a. Grab samples must be used for pH, cyanide, total phenols, oil and grease, sulfide and volatile organic compounds.

b. For all other pollutants, 24-hour composite samples must be obtained through flow-proportional composite sampling techniques, unless time-proportional composite sampling or grab sampling is authorized by the District. Where time-proportional composite sampling or grab sampling is authorized by the District, the samples must be representative of the discharge and the decision to allow the alternative sampling must be documented in the IU file. Using protocols specified in 40 CFR 136 and appropriate USEPA guidance, multiple grab samples collected during a 24-hour period may be composited prior to analysis as follows: For cyanide, total phenols and sulfides the samples may be composited in a laboratory or in the field; for volatile organics and oil and grease the samples may be composited in the laboratory.

c. For sampling required in support of the baseline monitoring and 90-day compliance reports required in Sections 3A and 3B of this

Article, a minimum of four (4) grab samples must be used for pH, cyanide, total phenols, oil and grease, sulfide and volatile organic compounds for facilities for which historical sampling data do not exist; for facilities for which historical sampling data are available, the District shall require the number of grab samples necessary to assess and assure compliance with applicable Pretreatment Standards and requirements.

5. Where the District performs all the required sampling and analyses in lieu of the IU, the user will not be required to submit the compliance certification required for this report. Where the District itself collects all the information required for the report including flow data, the IU will not be required to submit the periodic compliance report.

6. If sampling performed by an IU indicates a violation, the user shall notify the District Plant Operations Manager within twenty-four (24) hours of becoming aware of the violation. The user shall also repeat the sampling and analysis and submit the results of the repeat analysis to the District Plant Operations Manager within thirty (30) days after becoming aware of the violation. Where the District has performed the sampling and analysis in lieu of the IU, the District shall perform the repeat sampling and analysis unless it notifies the user of the violation and requires the user to perform the repeat analysis. Resampling is not required if District performs sampling of the IU at least once a month, or the District performs sampling at the user between the time when the initial sampling was done and the time when the user of the District receives the results of this sampling. If an IU subject to the reporting requirements of this Section monitors any regulated pollutant at the appropriate sampling location more frequently than required by the District Plant Operations Manager using the procedures described in this Title, the results of this monitoring shall be submitted to the District.

7. Samples collected to satisfy reporting requirements must be based on data obtained through appropriate sampling and analysis performed during the period covered by the report, based on data that is representative of conditions occurring during the reporting period.

D. Pollutant Monitoring Waiver

1. The District may authorize the SIU subject to a Categorical Pretreatment Standard to forego sampling of a pollutant regulated by a Categorical Pretreatment Standard if the IU has demonstrated through sampling and other technical factors that the pollutant is neither present nor expected to be present in the discharge, or is present only at background levels from intake water and without any increase in the pollutant due to activities of the IU. The District may authorize a waiver to sample for a pollutant if all the conditions found in 40 CFR 403.12 (e)(2) are met.

2. The District may reduce the requirement in Section 3C of this Article to a requirement to report no less frequently than once a year, unless required more frequently in the Pretreatment Standard or by the USEPA, where the IU meets the criteria of a Middle-Tier Categorical User as given in 40 CFR 403.12 (e)(3).

E. Compliance Schedule Progress Report.

The following conditions shall apply to the compliance schedule required by Section 3A7 of this Article or Title 7, Article I, Section 3C:

1. The schedule shall contain progress increments in the form of dates for the commencement and completion of major events leading to the construction and operation of additional pretreatment required for the IU to meet the applicable pretreatment standards (such events include, but are not limited to, hiring an engineer, completing preliminary and final plans, executing contracts for major components, commencing and completing, construction and beginning and conducting routine operation).

2. No increment referred to above shall exceed nine (9) months.

3. The IU shall submit a progress report to the District Director no later than fourteen (14) days following each date in the schedule and the final date of compliance including, as a minimum, whether or not it complied with the increment of progress, the reason for any delay, and, if appropriate, the steps being taken by the IU to return to the established schedule.

4. In no event shall more than nine (9) months elapse between such progress reports to the Director.

F. Certification

1. SIUs required to submit a WDP Application, BMR, ninety (90)-day compliance report, initial monitoring waivers and/or periodic compliance reports as required in Sections 2 and 3 of this Article, shall make the following certification for each such report:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete.

I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

2. Annual Certification by Non-Significant Categorical Industrial Users - A facility determined to be a Non-Significant CIU by the District must annually submit the following certification statement, signed in accordance with the signatory requirements in 40 CFR 403.12(l) and Section 7 of Title 1 of the District's Code of Ordinances. This certification must accompany an alternative report to the District.

"Based on my inquiry of the person or persons directly responsible for managing compliance with the Categorical Pretreatment Standards under 40 CFR , I certify that, to the best of my knowledge and belief that during the period from to ,[months, days, year]: (a) The facility described as [facility name] met the definition of a Non-Significant Categorical Industrial User as defined in 40 CFR 403.3(v)(2); (b) the facility complied with all applicable Pretreatment Standards and requirements during this reporting period; (c) the facility never discharged more than 100 gallons of total categorical wastewater on any given day during this reporting period. This compliance certification is based on the following information:"

3. Certification of Pollutants Not Present – IUs that have an approved monitoring waiver based on Article III. Section 3D of this Article, must certify on each report, with the following statement, that there has been no increase in the pollutant in its wastestream due to activities of the IU (40 CFR 403.12(e)(2)(v).

"Based on my inquiry of the person or persons directly responsible for managing compliance with the Pretreatment Standard for 40 CFR [specify applicable National Pretreatment Standard part(s)], I certify that, to the best of my knowledge and belief, there has been no increase in the level of [list pollutant(s)] in the wastewater due to the activities at the facility since filing of the last periodic report under Article III, Section 3.C. of this Title." [40 CFR 403.12(e)(1)]"

SECTION 4. Denial of Permit and Appeal Procedure

A. No discharge permit shall be issued by the District Director to any person whose discharge of material to sewers, whether shown upon his application or determined after inspection and testing conducted by the District, is not in conformity with

District ordinances and regulations, unless a variance of such nonconformity is granted by the Board in the manner set forth in this Title. The District Plant Operations Manager shall state the reason or reasons for denial or requirement for variance in writing, which shall be mailed or personally delivered to the applicant within five (5) days after denial or determination of a need for a variance. Where a variance is required, users shall follow the procedures set forth in Article II, Section 6 of this Title. Such petition for variance shall be filed within fifteen (15) days of the receipt of the District Plant Operations Manager's requirement for a variance.

Amended by Ord. 03/04-O-02 Eff. 2-23/04

B. If the application is deemed unsatisfactory by the District Plant Operations Manager, or if the discharge indicated from the permit application or inspection is not in accordance with the requirements of this Title, the IU may obtain review of the denial by the District Director, in accordance with the appeal provisions in Title 7, Article I, Section 5, provided that the IU shall give written notice of this request therefore, within thirty (30) days after receipt of such denial. The District Director will review the permit application, the written denial and such other evidence and matters as the applicant and District Plant Operations Manager will present to the District Director as soon as practicable and the District Director's decision will be the final administrative action taken by District staff. Any appeal of the District Director's decision will be taken to the Board in accordance with the provisions of Title 7, Article I, Section 5.

Amended by Ord. 03/04-O-02 Eff. 2-23/04

C. In the event it is determined by the District Plant Operations Manager that any discharge of wastewater to a sewer materially and substantially differs in type and volume from those characteristics set forth in the application and discharge permit issued based on a said application, the IU shall be subject to revocation of discharge permit, disconnection, fine and other penalties as herein provided.

SECTION 5. Monitoring Facilities

A. The District Plant Operations Manager shall require, to be installed and maintained at the IU's expense, monitoring facilities consisting of a large manhole or sampling chamber to allow sampling, inspection and flow measurement of the building sewer discharge. Monitoring facilities shall be installed on each separate discharge in the building sewer, in accordance with plans and specifications approved by the District Plant Operations Manager.

1. The monitoring facilities shall be located on the IU's premises, provided that if such location would be impractical or cause undue hardship to the IU, District Plant Operations Manager may allow the facility to be constructed in a public street or sidewalk area. Such facility shall be so located so that samples may be taken safely and easily and shall not be obstructed by landscaping, parked vehicles or other activity of the IU. IUs wishing to

change the location of monitoring facilities must obtain written approval from the District Plant Operations Manager before making such change.

2. There shall be ample room, in and near, such monitoring facilities to allow accurate sampling and monitoring equipment to be installed and to prepare samples for analysis. Such facilities shall be accessible to authorized representatives of the District at all times upon presentation of suitable identification from 8:00 a.m. to 5:00 p.m. five (5) days per week. Provided that authorized representatives of the District shall under exceptional circumstances have access upon presentation of suitable identification from 8:00 a.m. to 5:00 p.m. seven (7) days per week.

3. The location of flow meters and/or water meters shall be in an area of the property of the IU where they can be safely inspected. Water meters and flow meters shall not be located in confined spaces or in hazardous locations or areas on the property of the IU where hazardous operations are taking place. The District Plant Operations Manager will determine, at his discretion, whether or not flow meters and water meters of the IU are safely located.

B. Each IU whose wastewater discharges has, by sampling of wastewater or other means of inspection, been found to contain, or have the potential to contain, incompatible priority pollutants in amounts or concentrations which may cause interference with the wastewater treatment works process or operation, shall provide such enhanced monitoring facilities on each building sewer discharge which contains, or has the potential to contain, incompatible priority pollutants.

1. The entrance or manhole to such enhanced monitoring facilities may be secured by a break-away key type locking device installed by the District. District Plant Operations Manager shall have the only key to said locking device and will have complete control of access to the monitoring facility. When required by an IU, District personnel shall be available to open the monitoring facilities upon ninety (90) minute notice upon good cause shown. Alternative means of adequately securing such monitoring facilities may be approved by the District Director upon recommendation of the District Plant Operations Manager.

2. The enhanced monitoring facilities shall contain the following equipment installed in a permanently fixed position by the IU:
   a. A Palmer Bowlus flume or weir incorporated into the invert of the monitoring manhole.

   b. A dedicated source of electrical power to the monitoring facilities of sufficient voltage and amperage to operate all equipment in the sampling chamber. An appropriate device shall be installed by the IU

to indicate a power failure and length of time of such failure. Such device may be specified by the District and furnished by the IU.

c. Automatic composite sampling devices provided by the District will be installed and operated in the monitoring facility on a twenty-four (24) hour basis, seven (7) days per week. Samples will be collected by District personnel five (5) days per week and analyzed on a routine basis. The District will provide a split of each sample taken from said monitoring facility upon written request of the IU.

d. All measurements, tests, analyses of the characteristics of water and wastes to which reference is made in this Section shall be determined in accordance with Standard Methods 40 CFR Part 136.

SECTION 6. Inspection, Sampling and Records Keeping

A. The District Plant Operations Manager, or his designee, may inspect the facilities of IUs to ascertain whether the purposes of this Title are being met and if all requirements of the Title are being complied with. Persons or occupants of premises used by an IU shall allow the District, or its representatives, ready access, upon presentation of credentials, at reasonable times to all parts of said premises for the purposes of inspection, sampling, examination and copying of records required to be kept by this Title and in the performance of any of their duties. The District, or its authorized representative, shall have the right to set up on the IU's property such devices as are necessary to conduct sampling, monitoring and metering operations. Where requested in writing by the authorized representative of the IU, the District shall leave a representative portion of any sample taken from any sample point on the property of the IU. In cases of disputes arising over shared samples, the portion taken and analyzed by the District shall be presumed to be the valid sample. Where an IU has security measures in force which would require suitable identification, necessary arrangements shall be made with their security guards so that upon presentation of suitable identification, personnel from the District shall be permitted to enter immediately for the purposes of performing their specific responsibilities. Failure of an IU to allow District, or its representatives, ready access, or failure to comply with other provisions of this sub-section shall be a violation of this Title and subject the IU to any remedies the District may have, including without limitation, fines of up to $1,000 per occurrence.

B. Maintenance of Records

1. IUs and District Plant Operations Manager shall maintain records of all information resulting from any monitoring activities required by this Title, including documentation associated with Best Management Practices.

2. In addition to the requirements of Subsection B1 of this Section, IUs shall retain the following self-monitoring data for all samples:

   a. Date, exact place, method and time of sampling and the names of person or persons taking the samples.

   b. The date analyses were performed.

   c. Who performed the analyses.

   d. The analytical techniques/methods used.

   e. The results of such analyses.

3. District and IUs shall maintain such records for a minimum of three (3) years. This period of retention shall be extended during the course of any unresolved litigation regarding the discharge of pollutants by the IU or operation of District's pretreatment program or when requested by the Administrator.

SECTION 7. Pretreatment

IUs shall provide necessary wastewater pretreatment as required to comply with this Title and shall achieve compliance with all applicable Pretreatment Standards, local limits and the prohibitions set out in Article II of this Title within the time limitations as specified by appropriate statutes, regulations, and ordinances, whichever is more stringent. Any facilities required to pretreat wastewater to a level acceptable to the District Plant Operations Manager shall be provided, properly operated and maintained at the IU's expense. Detailed plans showing the pretreatment facilities shall be submitted to the District Plant Operations Manager for review and must be acceptable to the District Plant Operations Manager before construction of the facility. The IU shall obtain all necessary construction/operating permits from the IEPA. Such pretreatment facilities shall be under the control and direction of an IEPA certified Wastewater Treatment Operator. The review of such plans shall in no way relieve the IU from the responsibility of modifying its facility as necessary to produce an effluent acceptable to the District Plant Operations Manager under the provisions of this Title. Any subsequent significant changes in the pretreatment facilities or method of operation shall be reported to and be accepted by the District Plant Operations Manager prior to the IU's initiation of the changes.

SECTION 8. Confidential Information

Any information submitted to the District may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission in the manner prescribed on the application form or instructions, or, in the case of other submissions, by stamping the words "confidential information" on each page containing such information. If no claim is made at the time of submission, the District may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR Part 2 (Public Information).

A. Effluent data. Information and data provided to the District pursuant to this part which is effluent data shall be available to the public without restriction.

B. District. All other information which is submitted to the District shall be available to the public at least to the extent provided by 40 CFR 2.302.

SECTION 9. Closure Plans

In the event that a Significant Industrial User (SIU) closes, or if the processes that classify the user as significant are closed, the user shall file a written closure plan with the District. The closure plan shall contain, at a minimum, the following:

A. A description of each wastewater generating process that will be closed.

B. A description of how the facility will be closed and the extent of operations during the closure period.

C. An inventory and estimate of the volume of all process wastewater, chemicals, and hazardous waste on site. A description of the methods for disposal, including procedures for removing, transporting, treating, storing, or disposing of all waste and identifying all off-site waste management facilities to be used.

D. A schedule of the closure activities indicating the time required to complete each closure step.